

THE PHILOSOPHY OF THE ACT

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PREFACE

THIS volume consists almost entirely of unpublished papers which George H. Mead left at his death in 1931. The papers were in varying stages of completeness and differed greatly in importance. There is no evidence that Mr. Mead would have published any of them in the form in which they now stand, and the reader will want to keep this fact in mind. They do, however, represent Mr. Mead's thought in the last ten or fifteen years of his life, and they are extensive enough to allow the partial construction of his largely unwritten philosophical system. They furnish the necessary supplementation for the full understanding of his condensed lectures published under the title of *The Philosophy of the Present* (Chicago: Open Court Publishing Co., 1932). Such considerations account for the present attempt to assemble the unpublished writings in a somewhat systematic form.

The reader who wishes to deal only with the best may be recommended to read in order Essays II, III, IV, VII, XV, XVI, XX, XXI, and XXVIII. There is obviously much repetition in the volume as a whole and much that Mr. Mead would have omitted or changed, but it was felt that the discerning reader would prefer in the main to make his own selection and would be able to temper his evaluations in terms of the varying degrees of excellency of the material itself. Essays II, III, IV, and XXX (Sec. F) are consecutive chapters of an unfinished book, while Essay XXI (called by Mr. Mead "Mind and Body") seems to have been the beginning of a systematic presentation of his views. All titles, including that of the volume itself, are due to the editors, with the single exception of the title of Essay XXVII. Footnotes have been added by the editors. Except for a large body of student notes, which contain much of interest on Mr. Mead's interpretation of the history of ideas,

the present material exhausts all the known literary remains deemed worthy of publication. Practically all the material from Mr. Mead's own hand was used; the remaining fragments are in the possession of the Department of Philosophy of the University of Chicago.

The long Introduction is not so much an introduction (though the first and last sections help fulfil this function) as an attempt to sketch the wider contours and implications of Mr. Mead's thought and to drop a plumb line into some of the intellectual depths which he sounded. It is hoped later to publish in one volume all of Mr. Mead's writings which were published during his lifetime.

Many willing hands have helped in the preparation of the material. This volume, in common with *Mind, Self, and Society*, and *Movements of Thought in the Nineteenth Century*, was made possible by Dr. Henry C. A. Mead and Dr. Irene Tufts Mead. We are also indebted to them for the biographical notes and the photograph used as the Frontispiece. Dr. Estelle Allen DeLacy, Miss Caroline Claiborne, Miss Gertrude Morris, and Mrs. C. W. Morris contributed greatly to the preparation of the typescript. Mr. Milton B. Singer, with the help of Mr. John Parshall, prepared the Index and, in addition, offered valuable comments on the Introduction in various stages of its development. Dr. Eugene Freeman and Mrs. J. M. Brewster read page proof. The assistance of such persons was in some cases made possible by the Committee on Humanistic Research of the University of Chicago, the Department of Philosophy, and the National Youth Administration. Mr. Donald P. Bean, Miss Mary D. Alexander, Miss Mary Irwin, and other members of the University of Chicago Press have contributed the same friendly care and fine workmanship to this volume which they contributed to its predecessors.

THE EDITORS

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INTRODUCTION

I. THE TASK OF THE PHILOSOPHY OF THE ACT

IN 1900, in the *Philosophical Review*, under the title of "Suggestions toward a Theory of the Philosophical Disciplines," George H. Mead sketched in outline a philosophy which may appropriately be called "the philosophy of the act." The emphasis upon action implicit in the growth of modern biological science had taken at times an abortive form, as if the organism merely responded mechanically to an environment which itself owed nothing to the organism. Such a position could not long stand in the face of the facts which crystallized in voluntarism as a biological and psychological principle. For American thought, William James had marked the emphasis in pointing out the insurgent character of the organism and the way attention helped to constitute the object of perception. Dewey had isolated the basic point in his 1896 article on "The Reflex Arc Concept in Psychology": the stimulus is actually a stimulus to the organism only in virtue of the implicit response or interest which sensitizes the organism to those features of the world capable of furthering the release of the response itself.

It is not difficult to generalize the correlativity of stimulus and response into the recognition that organism and environment are mutually determinative of each other. It is true that at the level of achievement of a naturalistic science, when organism and environment have taken their places in a world neutral to any observer, it often seems as if the environment produces, stimulates, and controls the organism; but even here it must be recognized that what the organism is attentive to is by and large a function of its impulses seeking expression. This is even more obvious if one puts one's self at the focus of action: here the world that stands over against one is the world that answers to dominant interests and problems. The difference is

often signalized by a contrast of physical and psychological environment, since from the point of view of physics organisms are simply among the physical objects in the world, while from the point of view of the organism the world is that which stands over against it as the object of its action. The relation between these two points of view is a central problem of the present volume.

In the 1900 article Mead seeks to determine the nature and interrelations of the philosophical disciplines when seen from the focus of the act. Although in the article Mead states many of his most characteristic positions, and even though its conception of the dialectic of the act provides the key to the present organization of his hitherto unpublished writings, the organization as there outlined has not been closely adhered to in the following pages. And this for many reasons: Mead's whole intellectual life was an amplification of the suggestions there made; the article is couched in a terminology that Mead gradually and in part relinquished; it has only the barest hint of the social conception of the act which was to result from his pioneer work in social psychology;¹ and it does not include the elaborate statement of scientific cosmology and categorial analysis which he later developed. In a sense Mead had returned in the later years of his life to an intensive development of the task set at the beginning of the century—a return made richer by the intervening elaboration of his novel and profound social psychology and his constant contact with diverse fields of scientific thought. The present volume aims to reconstruct out of Mead's unpublished writings this amplified version of the philosophy of the act.

Mead came early in the course of his development to the conviction that the basic act is a social act, that is, an act that involves "the co-operation of more than one individual, and whose object as defined by the act . . . is a social object. I mean by a social object one that answers to all parts of the com-

¹ This social psychology is found in the volume *Mind, Self, and Society* (Chicago University of Chicago Press, 1934).

plex act, though these parts are found in the conduct of different individuals."² The act of an individual organism is an abstracted fragment of such a social act, though, of course, a legitimate object of study. Mead's social psychology shows the method by which the individual members of human society are able through communication to take over into themselves the social act in which they play a part—a part which they themselves can control in terms of their now understood relation to the whole. Mind, as involving the symbolic internalization of the complete or social act, and the self, as an object that has itself for an object, are on this view seen as social emergents made possible through the process of linguistic communication within the social act—a position which Mead has elaborated in the greatest detail in *Mind, Self, and Society*.

Whether the social act be considered or the action of any component organism, certain general stages of the act are discernible: the stages of impulse, perception, manipulation, and consummation. The hungry animal has an impulse to eat; this impulse in turn determines what stands out as a distant stimulus to guide the ongoing action; the object that is approached is clawed, bitten, downed; with eating the impulse reaches its consummation. And similar examples could be chosen at the level of complex social organisms.

It is implied in Mead's account that the act may take place at either a reflective or an unreflective level. The pragmatic thesis that thought is a problem solving activity—that all thinking is instrumental to the consummation of an interest or impulse—is accepted. It is further implied that only man—and he through society—has developed the mechanism by which a blocked impulse can be dealt with reflectively. In man, through the emergence of mind as the operation of language symbols, the

² "The Genesis of the Self and Social Control," *International Journal of Ethics*, XXXV (1924-25), 263 and 264. Mead writes of Dewey "In the *Outlines of Ethics* we find the will, the idea, and the consequences all placed inside of the act, and the act itself placed only within the larger activity of the individual in society" ("The Philosophies of Royce, James, and Dewey in Their American Setting," *ibid.*, XL [1930], 227, reprinted in *John Dewey. The Man and His Philosophy* [Cambridge, Mass.: Harvard University Press, 1930], p. 100)

checked impulse is liberated by the individual indicating to himself the possible causes of the trouble, by setting up possible hypotheses to guide action, and by the testing of these hypotheses through action. It is in terms of the social dimension of communication that Mead traces in detail the process by which the enduring thing, the categories, and the cosmos implicated by science arise within the act. Here for the first time is sketched an elaborated pragmatic philosophy of science and the cosmology which results when the scientific world at an instant is seen as an instrumental abstraction in relation to the developing act. In man, animal impulse becomes enormously elaborated and intelligently guided, sensitivity to stimuli becomes the perception of enduring objects, manipulation is elaborated into the physical world of science, and consummation shares in the elaboration of impulse and its illumination through reason. Animals live in a world of events, man lives in a world of common meanings—and meaning for Mead is socially generated and sustained.

It is not difficult to see how the various branches of philosophy could be fitted into this pattern of the act. Philosophy itself "is concerned with the import . . . of the presence in the universe of human reflective intelligence."³ Logic becomes the analysis of the reflective act, deduction involving the confrontation of experience with an elaboration of existent meanings, induction involving the building-up of new meanings where old ones are not adequate; epistemology is transformed into an empirical study of the way knowing proceeds; the history of philosophy is interpreted—as is all history—in terms of the way thought extends memory for the guidance of the present; the philosophy of mind arises through a consideration of the manner in which the symbolical and the subjective arise as a stage in the reconstruction of the act; the philosophy of science is concerned with the genesis of scientific categories within the act and the relation of the world as presented by science to the world of common perception and the demands of action; metaphysics --

³ This volume, Essay XXVIII, p. 517.

when not used in the deprecatory sense of the artificial banishment of a problem by denying the reality of one member of the conflict and exalting the other—can be only the most general description of the world as it reveals itself in increasingly comprehensive social acts; axiology is grounded on a consideration of the consummatory or value phase of the act, the aesthetic being the penetration of consummation into early stages of the act, while the moral is the endeavor to achieve the maximum of value at the level of the social; education philosophically considered is seen as the process of internalizing the social act within the separate individuals and creating in them social interests; the philosophy of history is revealed as a consideration of the methods by which societies have sought to control themselves and their environments in the service of their basic needs and impulses; and the philosophy of religion is transformed into an empirical investigation of the nature of religious objects and the function they perform in the value system of society.

It is in some such way that Mead is able to find a place within the structure of the social act for all major philosophical interests. Though the details are not all worked out, it is difficult to see what more could be done in general in the way of indicating within the sociobiological framework of pragmatic thought the systematic interrelations of the perceptual, the conceptual, and the axiological. It constitutes a major achievement within the pragmatic movement and exhibits Mead as a thinker of the magnitude of Peirce, James, and Dewey.

2. In the volume, *Movements of Thought in the Nineteenth Century*, Mead stresses two of the circumstances leading to the appearance of pragmatism as a movement: one, the study of animal behavior which resulted from Darwin's work; the other, the acceptance of the empirical method of science.⁴ Combining these two points of view, pragmatism can be regarded as a biological (or biosocial) empiricism. It is an amplified empiricism which has become aware of the category of action and the relation of thought to behavior. It is, on the one hand, the

⁴ Chicago University of Chicago Press, 1936, p. 351.

philosophical generalization of Darwinism and, on the other, the acceptance of the method of science as the method of philosophy.

Various emphases on these two (empirical and biological) dimensions are possible, and it is plausible that many of the ambiguities of pragmatism have their explanation in this fact. Thus a predominantly empirical emphasis will point out that organisms are given in a world along with other things and are to be granted no privileged place in an empirical cosmology; while the predominantly biological emphasis will stress the fact that the world which appears for observation is a function of impulses seeking expression—and this point of view, carried to its extreme, would result in some sort of metaphysics of action, a biologized version of Leibniz and Hegel. On the first emphasis the organism is one unprivileged object in a world of objects; on the second, other objects appear only at stages in organic activity

Both points of view are to be found in Mead, as they must be in any pragmatist, and Mead devotes his major effort to their reconciliation. Mead undoubtedly emphasized the biological pole more than the empirical. This is especially so in the *Mind, Self, and Society* volume; it is less true in the present volume, where the scales are kept more evenly balanced: here we see the world as it appears over against the social act, and it is within this world that science is interpreted. In any case, the reconciliation of the biological and empirical phases of pragmatic thought constitutes for Mead a central problem.

The distinction under consideration throws light on, and may be illustrated by, Mead's treatment of the concept of truth.⁵ Stress the empirical motif, and truth becomes an adjective descriptive of a meaning that has been verified by the appearance of what was meant; stress the biologism, and a meaning becomes true when it leads to the ongoing of the blocked conduct in whose service it is functioning. That Mead placed in the forefront the latter doctrine is evident from his article, "A

⁵ James's view of truth would be equally suitable.

Pragmatic Theory of Truth";⁶ that he wished also to insist on the confrontation of meanings by what is meant is clear from the present volume. The statement in *The Movements of Thought in the Nineteenth Century* that pragmatism brings its two historical causes together by recognizing that the verification which science demands is the ongoing of the blocked conduct⁷ indicates the direction of Mead's attempt to locate verification in the perceptual world and to interpret perception itself as a function of conduct.

It is to be noted that both of the factors which Mead mentions in the genesis of pragmatism are scientific—one based on scientific content, the other on scientific method. More than once in his lectures he remarked that "since Descartes science has determined the direction of philosophical speculation." Mead himself made noteworthy contributions to social psychology, and he followed without reservations the implications for philosophy of the acceptance of the method of science. His novel theory of the past as functioning in and being tested by the reconstruction of a present⁸ results from his attempt to apply literally his instrumentalism and the experimental method to the field of history. His own lectures abounded in original and subtle interpretations of the place of science in the history of Western thought, and something of this, the third (the historical) dimension of his thought—quite on a par with his work as social psychologist and as systematic philosopher—appears in the volume *Movements of Thought in the Nineteenth Century*.⁹ Many of the implications which Mead draws from the acceptance of the attitude and the results of science will be noticed elsewhere in the Introduction and in the text itself. Two may

⁶ *Studies in the Nature of Truth* ("University of California Publications in Philosophy," Vol. XI [Berkeley, 1929]), pp. 65-88.

⁷ "The testing in its [the idea's] working-out means the setting-free of inhibited acts and processes" (p. 351).

⁸ See *The Philosophy of the Present* (Chicago: Open Court Publ. Co., 1932), chap. 1, "The Nature of the Past," in *Essays in Honor of John Dewey* (New York, 1929), and this volume, Essay VI.

⁹ See in this connection, "Scientific Method and Individual Thinker," in the co-operative volume, *Creative Intelligence* (New York, 1917).

be pointed out here, and the first—the implications for logic—only briefly.

3. To the corpus of logical material, Mead makes no contributions, and the lack of a detailed analysis of logic and mathematics is perhaps the most noticeable gap in his systematic inquiries. Nevertheless, Mead's mode of thought is not without significance for the foundations of logic. He develops what few empiricists have done: a theory of the universal¹⁰ adequate to an explanation of logical and mathematical concepts, as well as to the objectivity and communicability of scientific knowledge in general. He thus does something toward the creation of a theory of symbolism upon which logic and mathematics can rest—though Peirce had, of course, done much more. At the same time, this theory of universality is set within a philosophy of becoming, so that the existence of logical structure is seen to be compatible with an emergent metaphysics. A logical structure is interpreted as the structure of events in so far as abstraction is made from their temporal dimension, that is, in so far as a timeless space is squeezed out from the space-time character of the moving world. Mead offers some suggestions as to the interpretation of implication, probability, possibility, and necessity in terms of the act. A view of logic as the general theory of the reflective act would seem to accord with his position. His analysis of the reflective act is essentially the same as Dewey's¹¹ description of the stages of the problem, the data, the hypothesis, deduction, and verification. Dédution is seen to function within the wider process of reflection, and no sharp line is set up between the abstract or formal sciences and the natural or empirical ones. The ground is laid for exhibiting the empirical and pragmatic context of the formal sciences,¹² but the survey is not in detail carried out.

¹⁰ *Mind, Self, and Society*, § 12, and Introduction, Sec. VI. Cf. this volume, Essay XX and Essay XXXI, G, 5.

¹¹ In *Essays in Experimental Logic* (Chicago, 1916) and *How We Think* (Boston 1910)

¹² See in this connection Dewey's article, "What Are Universals?" *Journal of Philosophy*, XXXIII (1936), 281 ff.

The epistemological implications of the methodology of science deserve fuller discussion. Mead is particularly impressed by the fact that the scientist, whose particular business is to know, has no generalized problem of knowledge. To know, for him, is not the general problem as to how to get from an uncertain world of effects produced in the individual to the world beyond, which is supposed to cause those effects, for science always has an unquestioned world of existence and of meaning within which its problems appear and are tested—though any part of this world may in turn become an object of the knowing process.

Further, the world within which science operates is a common or social world; even observations to be acceptable must be confirmed “in the mouths of two witnesses at least,” and it is into this common world that the solution of the problems which appear to and are tested by individuals must fit. To know for the scientist is not to have existences and meanings given but to initiate a process of inquiry concerning some portion of the common world when that portion is no longer a suitable cue to action, an inquiry which then proceeds through the formation of hypothetical objects and their testing in the unquestioned world of things which surrounds the problematic area. In the most subtle theorizing and testing, Mead insists, the instruments and laboratory and fellow-workers of the scientist are there as unproblematic, are there as a world of things in which all theories are put to the test. Knowledge is not contemplation of meaning or existence but discovery of the unknown through hypotheses put to test by action in an unquestioned world of things.

This position would be acceptable only if experience itself had a social dimension, and that this is so is one of Mead’s basic and most fruitful claims. He not only argues that observation never reveals the self of the observer on a different status than surrounding things or persons but concentrates his efforts on showing how the subjective or mental appears within the common

world as a stage of its reconstruction:¹³ it is the stage of hypothetical objects or meanings which must be brought to the bar of observation to test their right to membership in the common world.

The private, as opposed to the subjective, is that which belongs to the experience of the individual as such. The private is not subjective, since it belongs, as Mead says, to the world that is there, and, as a polar concept, the private has meaning only over against what is common. Just as Mead began his matured social psychology with the social rather than with the individual act, so his cosmology and epistemology begin with an unquestioned world within which the subjective or psychical is set off as the mental or symbolical phase of the act, and the private is interpreted as that portion of experience which belongs to the individual as individual in contrast to that which is common. The error shared by both the traditional rationalists and the empiricists resides in making ubiquitous the spheres of the private and the mental, to the neglect of the common and the unquestioned. When "experience" is used in Lewis' sense as including the given plus interpretation or meaning,¹⁴ the doctrine that experience has both individual and social dimensions implies that there are individual and social aspects of the given, of meaning, and of knowledge.

One wishes that Mead had been the type of mind to elaborate more methodically his conception of social experience, the detailed bearing of his analysis on logical topics, the relation of ongoing behavior and perceptual verification in his concept of truth, and the relation of the individual and social factors in knowledge, but all of those who wish an empiricism richer and more adequate than the truncated empiricism of philosophical tradition will be grateful for the many positive suggestions

¹³ This theory of the mental as the stage of the hypothetical reconstruction of the act is found in "The Definition of the Psychical," *University of Chicago Decennial Publications*, III (1903), 77-112, except that the concept of the act as social has not yet been developed.

¹⁴ *Mind and the World-Order* (New York, 1929)

which Mead's writings offer. It is not to be expected that the new empiricism should immediately stand out for inspection with the clear lines of a classic temple.

II. SCIENCE AND EXPERIENCE

4. There seem to be two types of concepts and corresponding objects. One type refers to perceptual objects, the other to scientific objects. Perceptual objects answer to a complete response (e.g., food-seeking activity) whose phases include locomotion under the control of the distance qualities of an object, manipulation under the added control of the inertial phase of an object, and consummation under the stimulation of those qualities which complete the response in question. On the whole the existence of such perceptual objects is never questioned.¹⁵

Over against the perceptual things of direct experience there are the scientific objects encountered only as objects of thought. Broadly speaking, scientific objects constitute that class of things which only appear as entities of thought. But this is not a complete classification of scientific objects, inasmuch as some perceptual things may never be encountered except as objects of inference. Such, for example, are the other side of the moon and Caesar's crossing of the Rubicon. The objects in these ex-

¹⁵Some particular sensible feature of perceptual things may become dissociated from a complete object. Such, e.g., is a certain visual shape seen through the mist, so that one is undecided whether this appearance is a man, a stump, or a cow. The dark-gray appearance for the moment exists for the organism not as the quality of an object, for one cannot say this appearance exists as an attribute of a perceptual thing. Obviously under these conditions the visual appearance exists only in relation to the organism, here *esse est percipi*. Only under these circumstances, i.e., when a sensible quality elicits conflicting modes of behavior (as does this appearance, which may be a post-object or man-object), does any perceptual quality become psychical. Most philosophers agree that a sensible quality has a "mental" status only when there is no demonstrable ground for supposing that it exists in relation to any thing except the sensing organism—or, in an older terminology, the "perceiving mind." At any rate, Mead holds that such is the behavioristic condition under which sensible characters of things do become psychical or subjective. Whether Mead has explicitly said so or not it follows that his behavioristic identification of the psychical must reject (1) any form of idealism which maintains that the whole of our sensible world exists only in relation to the perceiving mind, (2) Locke's *type* of distinction between primary and secondary qualities, because this distinction is based on the intrinsic nature of qualities instead of upon their mediating or stimulating function in the complete response to things, and (3) realism in so far as it denies that sensible parts of things are ever psychical.

amples are regarded as perceptual things because if one were at the object in question, one would perceive it. The fact that one cannot traverse the space or time between one's self and an object means that the object can only be inferred, but it does not make such an object a scientific object. Objects which are capable of controlling overt responses if an organism were at the objects, even though the organism can never directly confront them, are still regarded as perceptual objects.

Scientific objects seem to be of two main types. First, there are those entities of thought whose actual existence would involve a contradiction. Such, for example, is a perfect gas as described by Boyle's Law. This law presupposes the existence of bodies which lose no motion as a result of impact, i.e., bodies which are both perfectly elastic and absolutely rigid—which is a manifest contradiction. Also, the existence of free-falling bodies involves a contradiction since all bodies offer friction when in contact and attraction when at a distance from one another. Again, a perfect lever presupposes the absence of friction between the arms and the fulcrum, but for bodies to exist without frictional resistance is contrary to the nature of bodies. There is, then, a class of scientific objects whose nature simply consists of their being formal or logical entities of thought, because the assumption of their actual existence involves a self-contradiction which renders them unthinkable.

Second, there are scientific objects, such as absolute space and time and the space-time of relativity physics, whose actual existence involves no self-contradiction but would contradict the existence of perceptual things as being material things and not mental states.

5. The question arises as to what is the relation between scientific objects and perceptual things. The solution of this problem solely by means of a logical criterion is rendered difficult if not impossible by the fact that any given type of scientific object (e.g., Newtonian concepts of mass, space, and time, and mathematical space-time) may give rise to alternative interpretations of nature each of which may be logically consistent.

Consequently, reason cannot offer grounds as to why one assumption should be accepted rather than another. Hence, the criterion of selection is nonrational. That is, our ground for selecting some alternative is to be found in what our overt behavior accepts as real. We accept as real the conditions which control our responses. Mead, as we shall see, refuses to assume any existence whose reality implies the unreality of perceived things, since these very things control not only overt measurements of the scientist but every scientific decision, such as the acceptance or rejection of any hypothesis, and the identification of what the scientist calls "exceptions."

When reason is dealing with our behavior toward things, all its problems arise in the realm of perceptual things. Our behavior to such things accepts them without question as the ultimate test of reality because we do not admit any scientific concepts as valid which do not express the uniform order of perceived events. Mead starts with the recognition that this is the nature of reason in practice, i.e., the research method of science. Consequently, his interest in this question of the relation of scientific objects and perceptual objects is twofold. On the one hand, he refuses to accept as the sole characteristics of existence the properties specified by scientific objects (e.g., mathematical space, time, space-time, or matter) if the result of this is to deny that experienced qualities (both primary and secondary) are properties of natural (physical) things. On the positive side, this presupposition of the reality of perceptual things requires that the most general characteristics of existence must be consistently interpreted as characteristics of both perceptual objects and scientific things. Mead thought himself to have made this position intelligible because he believed that his analysis showed that in the broadest sense both scientific things and scientific objects (such as space-time of relativity theory) are spatiotemporal.¹⁶

The objects of Newtonian science involved an identification of

¹⁶ A thing is spatiotemporal if all its properties vary from the standpoint of different observers

existence with a material content (resistance) whose spatial form was invariant for all observers. Thus reality was defined in spatial terms only. This means that the reality of things is independent of their relations to various systems of reference. Relativity metaphysics has tended to identify real existence with the logical structure of space-time to the exclusion of all material content, particularly the resistant contact of our measuring rods. Mead, as we shall see, holds that if we assume the sociality of perceptual things, then the spatial features of all things, in their own reference frame (consentient set), have all the permanence of Newtonian things, but the same features vary (i.e., become temporal) from the standpoint of another reference frame. Accordingly, the conceptualized universe is continuous both in material content and in form with the most general features of perceptual objects. Such is Mead's general position on the relation of scientific objects and experienced (perceptual) things. A fuller exposition of his position must, however, bear in mind his own unique description of the behavioristic form of perceived things

The following are the main points to be surveyed: (1) why existence, defined by the properties of Newtonian things, is incompatible with the physical existence of perceptual things; (2) Mead's analysis of the behavioristic form of perceptual objects (i.e., of experience); (3) how this description partially reconciles the metaphysical separation of scientific objects and perceptual objects; (4) how relativity physics invalidates the existence of spatial objects which are not also temporal; (5) a statement of the metaphysical position which defines existence simply as the logical structure of space-time, relegating all material content of perceived things to the subjective experiences of different observers; (6) why Mead rejects this doctrine; and (7), finally, a statement of his own position.

6. Newtonian physics defined the most general characteristic of existence as resistant matter whose spatial form was invariant under all conditions; the important presupposition being that the dimensions of matter were unaffected by the

relative velocities of masses. This implies that the rate of time's flow is likewise the same physical amount for all observers.

This conceptualized reality constitutes the ideal of exact measurement because at every instance all bodies are at rest, thus being at fixed distances from one another as expressed by the same measuring rod. This sort of a universe is the ideal of measurement because actual measurement consists of the overt act of laying down one resistant volume (unit rod) upon similarly resistant things being measured. All actual measurement reduces to a superimposition of congruent spatial units. This obtains regardless of whether the scientist is an "absolutist" or a "relativist."

But the identification of reality with the spatial properties of conceptualized things is incompatible with the physical existence of perceptual things since there are then no common factors between scientific and perceptual things. The reason for this lies essentially in the interpretation of time which is implied by the spatial definition of physical things. Since inertial bodies are homogeneous in quality at every instant, their behavior can only be spatial, i.e., consist in change of positions. This implies that time is not a characteristic of bodies, because time as a property of matter means a "coming to exist" and a "ceasing to exist" of heterogeneous qualities of bodies as well as different positions of bodies. But time implied by measurement is simply a homogeneous time whose parts have a uniform rate of flow and whose number we arbitrarily fix as equal to the number of space units traversed by some particular uniform motion taken as a standard.

If we assume that this conceptually spatialized time, implied by our concept of the spatial behavior of bodies, is the time which really exists, then time as a change in existing qualities, i.e., perceived time, must not be conceived as a change in the qualities of things but as a change of the qualities of certain spaceless entities, which entities by Descartes' definition are minds. Since perceived things do involve this change in qualities, we are forced to say that things observed in a laboratory

are not physical things but mental things. An organism in perceiving changes in physical bodies perceives in fact only its own changing mental states. The assumption that existence is described by a metaphysically separate space and time is inconsistent with our belief in the reality of perceived objects, and yet it is in the realm of such objects that all scientific problems arise.

A spaceless mind becomes on this view the precondition for the existence of perceptual objects. The mind's function becomes that of being the "seat" of the existence of all qualities which cannot be directly measured instead of a mechanism for inferring remote objects of subsequent behavior.

This conception of mind is opposed to Mead's theory of the mind as a unique set of responses that occur relatively late in life and arise in the medium of overt social responses of a group. It was his psychological inquiries which initially motivated his attack upon the assumptions of classical physics. Relativity physics reinforced but did not lead him to his own alternative assumptions.

To sum up: perceptual things, if real, are spatiotemporal. To define physical existence in spatial terms alone gives rise to a bifurcation of scientific and perceptual objects, because they then have no common factor. Both must be spatiotemporal if both are equally real objects in a single physical world.

7. We shall now turn to Mead's analysis of the spatiotemporal character of perceptual things in terms of the responses of organisms to them.¹⁷ This procedure involves six steps. First, it is important to consider carefully the difference between an organism and a physical thing as these are given in immediate observation. Second, we should see that a whole perceptual thing falls into three functionally distinct phases. Third, we

¹⁷ It is well to realize that in this analysis Mead is not presupposing the existence of any mind. The analysis requires only the assumption of organisms (a species of perceptual things) in an adjustive (response) relation to perceptual things prior to the existence of minds. Of course, that organism which is doing the analyzing has a mind, but the type of behavior and objects which are being analyzed do not presuppose mind. Existence is given in perceptual things acted upon and in the sensitive organism which acts. An organism's overt response is a unique kind of motion (described later) which occurs between different phases of perceived things.

should see how a whole response to perceptual things also falls into three structurally and functionally distinct phases, and how the phases of both the perceptual object and the response are complementary to each other. Fourth, it is then necessary to interpret the relation of signs¹⁸ and referents in terms of overt response to perceptual things. Fifth, having done this, it is a simple matter to see why Mead holds that the change of perceptual things is both temporal (qualitative) and spatial, i.e., that there is no qualitative change in a thing without a change in its spatial magnitude. Then, last, it is easy to see what is psychologically necessary in order that an organism may separate the inertial space of things from their temporal qualities so that all the latter may become symbols of a system of spatial particles having fixed distance relations at every instant.

We shall give only the briefest statement of the distinction between a physical thing and an organism. A physical thing is a spatial volume whose activity at each instant tends to repeat the same state of rest or uniform motion. It follows that change in its activity can only result in quantitative differences in its existence at different moments. Thus, we can say that body *A* at t_1 is tending to move uniformly in future moments at ten feet per second, and at t_2 it tends to move at thirty feet per second for all future time. Hence, change in the activity of physical things can only be an acceleration of rate or direction of movement through space. Such spatial change is, therefore, not a movement of the body from one kind of existence into a qualitatively different kind of body.

An organism is a physical thing whose activity (or activities) at any moment is a tendency to bring into existence an organism different in quality from the organism which exists at a given moment. The stimulation of a perceived thing (food) may effect a spatial change in a specific activity (food-seeking) with

¹⁸ It is to be understood that signs are not language symbols and that the reference relation as found in overt nonreflective behavior is not a cognitive relation. It is an error to suppose that the cognitive reference from language symbols to referents and the reference from signs to referents are one and the same thing (see n. 25)

respect to the stimulating thing. This spatial change in an activity is called a "response" in contrast to an "acceleration."

At least two basic facts distinguish a response from an acceleration. First, a response is not merely a change of position of an organism. It is a spatial movement toward an object in which an organism passes from one qualitative kind of being to a different kind of existence. A food response is a motion in which an organism passes from a hungry being into a satiated being, and the organism's attainment of this new kind of existence marks a termination of its response to the object (food). A response is a spatial change which has three properties: (1) rate, (2) direction with respect to a perceived thing or things, and (3) the quality of existence which an organism becomes in the consummatory phase of a response. For example, at the termination of a food response an organism is a satiated thing instead of a hungry animal. This third factor is the prime difference between a response of a body and an acceleration of a body. It is this factor which makes behavior teleological rather than mechanical in form.

Second, the beginning of any specific organic activity (such as food-seeking) is an impulse phase (e.g., the acceleration of the blood and the flow of glandular secretions) of a whole act which may exist without involving the change of position of the whole organism. But this early phase of an act is one of the forces (the actual object is the other) causing a change in rate and direction of change of the whole organism with respect to perceived things. Consequently, the change in rate or direction of a response would not be necessarily proportional to the applied stimulus force or have the direction of the applied force.

Now we must consider jointly the other two points mentioned previously, viz., the phases of any perceptual object as related to the phases of a complete response to a perceptual thing.¹⁹

In considering the response itself, we may neglect its impulse

¹⁹ It is important to realize the distinction between a perceptual thing and a physical thing. A physical thing is defined as an inertial volume. A perceptual thing is a physical thing which includes distance qualities such as colors, tastes, odors, sounds.

or motive phase. It is held by Mead that every typical response to a perceptual thing consists of three phases: perceptual,²⁰ manipulatory, and consummatory. The simplest illustration is the response to a food object. We must avoid here an incorrect inference. It is, of course, recognized that a response to a perceptual thing may not always involve manipulation. The manipulatory phase may practically drop out, provided the consummatory phase of an object is given to the receptors upon the incidence of the contact part of an object. In such a case, the contact part itself is not functionally a manipulatory thing but directly consummatory. Let a person carry out a fatigue response to a bed. If the approach to the bed calls out directly the act of lying down and resting, then the bed, for that fatigue response, consists almost entirely of perceptual and consummatory phases. If, however, the approach of the resistant part of the bed stimulates various movements which we call "making the bed," and only after these follows the lying-down, then the fatigue response includes all three phases. A response never includes more than the three phases mentioned; but there may be responses in which at a particular time manipulation becomes very slight. One might contend that manipulation never completely drops out, for, even in lying down, one must act in certain ways to an object and not in other ways. But where consummation begins with the coincidence of contact, the manipulatory phase of a thing hardly lies between the beginning locomotor phase of a response and the consummatory phase.²¹ The question whether any phase is completely absent may be left open, certain it is that in a given response some of the phases

²⁰ Two points should be mentioned here (1) By "perceptual phase" of a complete response is meant (a) the locomotion or movement of an organism through the space lying between the contact surface of the organism and the similar surface of things, (b) such locomotion being under the control of the distance aspects of things. It is important to note that the word "perceptual" involves both (a) and (b). (2) One might use the term "perceptual" to refer to all three phases of a complete response. In this case, the first phase would be called the locomotor phase of a complete response. But this usage would not bring out the control of locomotion by the distance qualities. Even if this were no real objection, Mead uses the terminology of (1).

²¹ Mead, *The Philosophy of the Present*, p. 170.

may be hardly discernible. In any case, it is plain that a whole act extends over a considerable interval of time and space.

Now consider a stimulus object which fits into a complete response to perceptual things. Like the response, its object also falls into three functionally distinct phases: (1) those stimulus qualities which mediate locomotion, (2) those which mediate manipulation, and (3) consummatory qualities which complete a response.

This classification of properties of objects, Mead would urge, is based on their respective functions, i.e., the structural part of a given response which each controls, and not upon their intrinsic "sense" qualities. For example, odors and colors are very different in quality, but both may control a perceptual phase of a food response. Certainly they could not control manipulation, though they might guide the direction of manipulation. But one cannot manipulate a color or an odor.

It must be borne in mind, too, that the same distance phase of a thing may function as a consummatory stimulus in one response, while in another it may function as a perceptual stimulus. Even the same kinds of qualities may be functionally different in the same acts. Thus, a certain view of a painting may call out locomotion to the painting, whereupon the painting is handled so as to get another view which is then the consummatory phase of the whole painting. In both cases it is visual phases of the painting which function as perceptual stimuli and consummatory stimuli in the whole response to the painting.

This illustration brings out another important fact. The manipulatory phase, i.e., the resistant phase of an object, always lies between the perceptual and consummatory phases of an object. The inertial phase of perceptual things separates the perceptual from the consummatory phase of a whole response. This is very evident in the example of the response to the painting.

It is worth while to note three unique facts about the manipulatory phase of a perceptual thing. First, it is a resistant inertial

volume, and its existence is directly given only when in a contact relation with the organism, which is also a resistant volume. In this area, defined by the contact relation of the organism and the inertial character of things, the thing is making a response to the organism which is continuous in kind with that of the organism toward the thing.²²

This resistant response of the thing to the resistant response of the organism is the only quality of a perceptual thing which is always identical in both the object and the organism.²³ The fact that only this "element of activity," expressed in the term "resistance," is identical both in the organism and in outer things distinguishes the primary from the secondary qualities.

Since the resistant character of a thing is a reaction of the object which stimulates the same kind of reaction in the organism to the thing, certain important facts follow:

First, the resistant response of the organism and the resistant response of the thing exist simultaneously; hence, it is only as the organism first directly experiences the resistances of other things that it perceives itself as a physical thing. It must find the resistant boundaries of other things in order to define itself

²² "The thing stimulates the organism to act as the thing acts upon the organism . . . The resistance of the object is continuous with the effort of the hand . . . Matter is the name we give to this nature of things, and its characteristic is that it is identical with the response that it calls out Weight as pressure, or inertia as resistance to change of rest or motion, is identical with the effort by which the weight is upheld or the body is brought into motion or set at rest . . . Resistance, or the affective occupation of space, Locke's 'solidity,' has in experience a common character as Locke felt, which is both in the individual and in outer things" (*ibid*, pp 122 and 134)

²³ "The body has an abundance of other characters which inhere in the matter, but none of these others has this characteristic Color, sound, taste, and odor cannot be identified with the responses which they elicit, either in organisms or in other objects, while the experiential inner content of matter is identical with the responses which it calls out in things. . . In the case of the secondary qualities the characters which appear in our vision, hearing, tasting, and smelling cannot be shared with the characters in the physical object which they answer to It is not by being red, or salty, or noisy, or redolent that the organism finds itself in relation with objects having these characters It is by resisting that the organism is in relationship with resistant objects . . .

In contact experience the resistant character of the object is identical with the resistant character of the organism, while in distant experience the character of the object is in no way present in an organism" (*ibid*, pp 123, 133-34, and 137)

as a resistant boundary of effort. The organism perceives itself as a thing no sooner than it perceives other things.²⁴

A "world at an instant" (i.e., a measurable reality) obtains when its different parts exist at fixed distances from one another, when these parts remain the same in kind, and when there is congruency of similar parts. Further, only those existences are congruent which are resistant volumes. Only a spatial or nontemporal kind of existence is directly measurable because only such existences can be superimposed on one another and do not come into or pass out of existence with the passage of time. It is now apparent that such congruent spatial nontemporal existences obtain in an organism's response only upon the occurrence of the contact relation. This is not a very large world in area, but, if one could explain how it is extended to an indefinite size, one would explain simultaneously the origin of the idea of a completely measurable universe, the separation of time from space, the distinction of the primary (spatial) from the secondary (temporal) qualities, and the function of the Christian notion of the soul in making acceptable the dualistic theory of nature and mind.

There is a second characteristic of the resistant phase of perceptual things. Since the thing's resistant reaction to the organism is of the same quality as the resistant response which it stimulates in the organism, it follows that the manipulatory phase of a response can only effect a spatial change in the resistant phase of perceptual things. This means that manipulation may (1) accelerate this aspect of the perceptual thing, according to Newton's laws, (2) subdivide it, or (3) transmit the force of the manipulatory response to a third thing through the medium of a second. But, by controlling the spatial behavior of the manipulatory characters of perceived things, an organism determines what shall be their other (temporal) qualities.

²⁴ The infant "finally reaches himself as a thing through the action of other things upon him." We are not "justified in assuming that an individual locates an inside within himself before he does in other things. It ought to be sufficiently evident, though it is in fact quite generally overlooked, that we become physical things no sooner than do the objects that surround us" (*ibid.*, pp. 122 and 135).

We now wish to return to a consideration of the perceptual and consummatory phases of a perceptual thing. These are both distance qualities, but our main task is to interpret this factor of distance in terms of response. It is apparent that such qualities are temporal because they pass in and out of existence during the changing phases of the complete response. But the main question is whether or not this temporal change is also a variation of the spatial extension of the whole object. If so, then the temporal distance of things is equivalent to their spatial distance, and their space would not exist independently of time, since both alike pass in and out of existence. But this problem requires an explanation of the reference relation between the three phases of a perceptual thing.²⁵

The reference relation, as found in responses to perceptual things, may be considered from two standpoints. First, this relation may be considered under conditions where a response is actually completed. From such a viewpoint we may define this relation behaviorally by the following procedure. If the act is completed, obviously one phase of the perceptual thing calls out and terminates the end phase of the response; such a phase is the consummatory aspect of the thing. This aspect of a perceptual thing is called the referent point of the complete response coming toward it (e.g., the masticatory phase of the food object). The consummatory character of the object is the referent of the complete response. The remaining temporal qualities are stimuli which move the organism through space toward the consummatory referent and are called signs²⁶ of the referent (e.g., the visual cheese functions for the rat as a sign of the gustatory cheese). In actual practice it is well to note that not all temporal qualities are signs, owing to the fact that perceptual things are in part consummatory things. Things as

²⁵ See two articles in the *Journal of Philosophy*, September, 1936, by John M. Brewster, entitled "A Behavioristic Account of the Logical Function of Universals."

²⁶ It is maintained in the articles referred to in the previous note that a sign in no way implies the existence of ideas. Only in the case of language symbols, which emerge out of gesture signs, do we have ideas. Only here does the reference relation become a cognitive relation.

objects of responses are as much teleological in their order of stimuli as are the phases of the whole act itself.

The reference relation is that which connects a sign and its referent. This is the overt response itself which the sign invokes toward the referent. The reference relation is a perfectly objective affair. It is not a "mental state" but a matter of response relations between parts of the environment.²⁷

We have considered now the reference relation on the supposition that the temporal phases of perceptual things assume different stimulus functions in a given response. This, of course, is what actually happens. But we have also seen that in different responses to the same thing (as a painting), or to different things, any distance quality may function as a sign. We may therefore consider the supposition that all the distance qualities of the same object or of the whole field of objects function only as signs. In this case we must ask what aspect (necessarily nontemporal by this supposition) of a perceptual thing or things is the common referent of all these different signs.

We must note clearly the conditions of this supposition: perceptual things would not in this case have any consummatory phases, but the number of sense qualities (visual, olfactory, thermal, etc.) would be the same as before. Flavors of the steak remain, but they only stimulate perceptual phases of food responses, never actual mastication. If all the distance qualities of all things functioned only as signs, these things would never give us peace, since no response could ever find its consummatory completion. No response could go beyond its perceptual phase; no food would ever be consumed; no aesthetic act would ever find the poet's "concord of sweet sounds"; no lovers attain embrace.

Second, if all temporal qualities of a perceptual thing or of all things functioned only as signs, the common character of all these things referred to would be (a) nontemporal or merely

²⁷ Thus Mead asserts that meanings (i.e., reference relations) are in nature and not "in the mind." These, rather than Locke's simple ideas, are the raw materials out of which mind and ideas are made.

spatial and (*b*), in addition to mere extension, would have a resistance which would put a stop to the movement of the organism because any stimulus to further change in space is a temporal quality. This common referent would be a physical limit beyond which no further response (i.e., change) is possible but, at the same time, would not permit the completion of a single response. Such a character of perceptual things is found in their resistant volume phase.²⁸ Upon the supposition that all temporal qualities function only as signs, the resistant contact characters of perceptual things would be the common referent point of all distance qualities.²⁹

If an organism carried out all the responses (i.e., reached by locomotion the resistant referents signified by all signs), it would butt into an existence, a reality, at which its responses would be completely stopped. Such an existence could not even be manipulated because, in manipulating a body, the organism moves it, and this movement would be toward other resistant things. This implies that the organism would not have carried out all responses elicited by other signs of other things. But this is contrary to our supposition. Hence, the attainment of the referent of all possible signs would stop all phases of response.³⁰ In short, the organism would have literally run itself to death without having completed a single act.

It was previously stated that a behavioristic explanation of the reference relation was necessary to a spatial interpretation

²⁸ It is perhaps because all temporal qualities may be regarded as functioning as signs that Mead says that all temporal qualities may be referred to the resistant phase of perceptual objects as their common referent, or as he puts it, "actual or possible contact is the reality of distance stimulation."

²⁹ It should be emphasized, as Mead himself emphasizes, that the resistant phase of a thing or things is not the final referent of signs. To hold such a view would be to neglect the consummatory phases of the act and the object. The ground for making the contrary assumption is (*a*) that we do so refer signs to resistant things when it is a question of controlling the kind of distance qualities we want, and because (*b*) any distance qualities may in different acts function as signs. The theoretical value of this supposition is to show that the quality of a measurable and timeless reality in which motion (viewed either as response or as acceleration) is impossible, is directly present in perceptual things.

³⁰ This volume, Essay XXI, p. 419

of distance qualities in terms of the act, and also to decide whether or not the spatial and temporal magnitudes of things have independent existence. We are now prepared for this task.

If all distance qualities always functioned as signs, the resistant part of perceptual things would become the final referent of all distance qualities. Further, since this referent is resistant, it is the physical limit of all possible responses. This discovery is quite essential to our main purpose. Having now found that the *terminus ad quem* of all possible responses is the resistant properties of perceptual things, the discovery of the *terminus a quo* becomes easy; it is the bounding surface of the organism itself (which is a perceptual thing) from which all responses proceed. Between these two limits lies the whole of the spatiotemporal extension of all perceptual things. This is the distance relation in which lies all change of action, be such change an acceleration or a response. This spatial and temporal distance of perceptual things is simply the order in which sign qualities pass.³¹

Both the qualitative (temporal) and spatial changes of things may now be interpreted in terms of the responses to these things. The resistant phases of things are the final referents of all temporal qualities when these are all regarded as signs. The temporal qualities (signs) are causally efficacious at the receptor surfaces of the organism and stimulate a response (spatial change) of the organism to the resistant phases of things. At any moment the spatiotemporal distance between any sign phase of a thing and its inertial phase lies between the contact surfaces of the organism and the inertial phase of the perceived thing. Since this distance coincides with the spatial and temporal magnitude of the response to the thing as a whole,

³¹ Thus far Mead agrees with those "event philosophers" who discard the category of substance as referring to any permanent existence or reality. But it is to be remembered that the passage of events lies within a frame of things which do not pass. To get these permanent objects, we find these "event philosophers" introducing "eternal objects" which look very much like the old substantial things baptized with a new name. Mead finds these permanent frames of objects to be the resistant character of perceptual volumes.

it follows that we may interpret the spatiotemporal change of each perceptual thing in terms of some part of the response which is repeated throughout the whole response.

The spatial distance of a given sign phase of an object is equal to the number of functionally equal steps necessary to transport the organism to the contact referent of this sign phase. This equality of steps may likewise be defined in terms of an act. Given a symmetrical organism, then its steps are functionally equal if they keep the organism moving in the line of vision of a thing. The temporal distance of any sign phase of each thing is the number of repetitions of some rhythmically repeated phase of the response, such as the heartbeat. Thus, the spatiotemporal distance of the visual sign phase of an apple might be twenty steps and ten heartbeats. The rate at which this distance passes would be the ratio of these. Thus the rate at which the apple was passing might be two steps per heartbeat.

Certain conclusions follow. As actually experienced, the space of things passes out of existence with their temporal passage, i.e., with change in their qualities. The rate of their passage is that of the passing response. However, perceptual things as a whole could not even theoretically pass out of existence because at the conclusion of all possible responses, elicited by signs, an organism would find itself stopped upon contact with the inertial phases of what were, during the responses, temporal things. The whole of existence cannot cease to be inasmuch as there is one phase of perceptual things which is nontemporal. On the other hand, with the passage of the spatiotemporal phase of perceptual things, the organism would find itself at the kind of existence in which no further response or change of any sort is possible. In short, by completing all the responses which are elicited by the signs that strike the receptors at any moment, the organism would have separated temporal existences from nontemporal or spatial existences because it would have come to an end of all changing qualities which were but signs stimulating its responses to this unchangeable referent.

This achievement is, of course, impossible by overt behavior,

though it is theoretically possible. In practice a perceptual object always remains a spatiotemporal thing. However, one may hold that, with the emergence of thought, signs become symbols of a merely spatial existence such that in inference an organism collapses the distance between itself and inertial particles so far distant and so small that this inferred realm could never appear in direct perception. Such an organism would achieve as an object of this reflective attitude a universe of bodies whose existence is the same at each instant and in which action is impossible; and, further, all sign stimuli would have become symbols of a realm forever beyond the possibility of perception, for even large manipulatory volumes might be referred to the effects of small particles which the hand cannot touch. Mead believed himself to have discovered the behavioristic explanation of this inference.

8. However, for our problem it is not necessary to follow Mead's description of the behavioral processes involved in the emergence of ideas or mind. It is sufficient to point out that the assumed "continuity" of manipulatory "effort" and inertial "resistance" of perceptual things implies a common factor between experienced things and scientific objects of classical physics, the latter being abstracted from the former. Hence, it is easy to feel that scientific objects are essentially "perceptual models" both as to their invariant form and as to their material content. This feeling was reinforced by the fact that this assumption was not until lately counteracted by the actual results of measurement based upon it. The process of actual measurement consists in laying a rod end to end upon the matter measured. If along two distances a rod is laid down the same number of times, the acts of measurement are identical. Where the acts of measurements are numerically identical, it is natural to assume that the two distances measured are physically identical.³² This amounts to saying that all space is but an extension of the space found in the contact perspective of the manipulatory phase of perceptual things, and that scientific objects are

³² C. D. Broad, *Scientific Thought* (London, 1927), pp. 125-26.

based on perceptual models. So long as the results of measurement did not conflict with this assumption, the physicist was not disturbed by its fallibility on other grounds.

As long as pushing and pulling of resistant things with calculable velocities could be located in space, scientific imagination did not leave the world of perception.³³

The connection of scientific with perceptual objects was close enough to make him [the scientist] feel that his observations and experiments were in the same world with the objects of his science.³⁴

Of course this assumption, though consistent with the results of the method of measurement, was inconsistent on other grounds. The secondary qualities were then lodged in the mind. This in turn set up mind and nature as separate substances with a causal relation between them. It followed from this theory that both the contact aspect of things and their distance qualities fell heir to the same subjectivity. "If the scientist had been consistent he would have had to relegate to consciousness the resistances of things as well."³⁵

Mead's behavioristic account of mind finds a continuity between the relatively constant spatial features of scientific things and the spatial aspects of perceived things, and in no wise presupposes mind as a nonextended substance. But the scientist's assumption that reality consists of spatialized scientific things brings the substantial mind back as a locus of the temporal qualities of experience. We can hardly assume, however, that an organism is endowed with two different sorts of "minds." Naturally, Mead heartily welcomed relativity physics in the interests of his own psychology and his interpretation of the research procedure of science.

9. In the Michelson-Morley experiments the actual method of measurement led to the discovery of data which could not be explained upon the metaphysical assumption that physical reality consisted of bodies having invariable quantities of mass. Instead, these masses vary with a motion which is relative to the

³³ Mead, *The Philosophy of the Present*, p. 153

³⁴ *Ibid.*, p. 152

³⁵ *Ibid.*, p. 153.

reference frame of the observer. But a variation in mass means that time is a characteristic of space. Consequently, it was the scientist's method of measuring perceptual things, and not any theory of psychology, which overthrew the assumed metaphysical separation of space and time. The existential separation of space and time actually no more obtains for scientific things than it does for perceptual things.

In the geometry of a Minkowski space-time perceptual motion disappears. The ether has vanished, and events take the place of physical things. Time is assimilated to space, and the mind with its own spatial frame of reference adventures into this space-time whose curvature corresponds to the gravitational constant.³⁶

Gone is the Newtonian thing in which the mathematical structure of existence was immanent in the inertial mass of perceptual things. The permanent uniform character of scientific objects is no longer the form of invariant matter. Scientific objects consist only of the logical structure of space-time, emptied of all material content of perceived things. "Form" is completely separated from "matter."

10. The question arises as to what interpretation one shall give to perceived things, to the status of space-time structure, or to transformation formulas.

Mead considers two alternatives. The first assumes that real objects of nature are not perceptual things but are instead hypostatized mathematical structures of space-time, thereby relegating to consciousness or "neutral stuff" all the qualities of perceptual things.

The result is to carry the whole world of perception and perceptual imagination into perspectives that exhibit only a logical correlation between patterns affected with transformation formulae and events in a four dimensional time-space and intervals between them. . . . We reach them by way of the reference in the knowledge process to something beyond itself, and by a theory of probability. In our mathematical formulations of scientific experience we have come upon a cipher that seems to refer to inexperienceable entities and their mutual relations, and this hypostatized structure of logical entities satisfies our desire for an absolute reality to which our confessedly relative experience shall refer.³⁷

³⁶ *Ibid*

³⁷ *Ibid*, pp 153 and 154

11. Mead does not reject this metaphysical interpretation of the logical structure of space-time on the ground of logical inconsistency. He rejects it on practical grounds. That is, when reason acts as a problem-solving procedure (as in scientific method), our total behavior, reflective and overt, unquestionably accepts as real the contact things of the laboratory.

Mead indicates specific respects wherein the practice of reason accepts the reality of perceptual things. First, the beginning of the reflective behavior on any scientific problem starts from an "unquestioned" reality of contact things.

The scientist starts with an unquestioned material world and with unquestioned objects that appear in the problem with which his research is occupied. Although he . . . exhibits the errors and illusions of perception, his criticism is always founded on objects that are there, and his criticism does not invalidate these, since he must appeal to them as tests of the errors he discovers.³⁸

Second, it is the unquestioned reality of perceptual things which the scientist's rational behavior accepts as the test of the validity of conceptual objects, Newtonian masses, or Minkowski space-time. Consequently, his

cognitive proceeding is from an accepted perceptual world through exceptional instances and conflicting meanings on to the same world, after its meanings have been reconstructed. That world itself he never questions.³⁹

Third, our overt process of measurement accepts as real the instruments with which we measure. "Our relevant measurements must still take place by means of physical things," though, to be sure, the causal antecedents of perceptual qualities "can no longer be stated in terms of physical things, in the sense that they are conceivable permanent contact-experiences referred to by distance-experiences."⁴⁰

Fourth, the only means by which our *intelligent practice* identifies "exceptions" is by accepting without question the reality of perceptual contact. Mead points out that the "appeal of sci-

³⁸ *Ibid.*, p. 140

³⁹ *Ibid.*

⁴⁰ *Ibid.*, p. 150. Mead does not, of course, assume their reality "in this sense." The sentences following the quoted sentence are especially pertinent to the point under consideration.

ence to its perceptual findings is its criterion of reality." So far as the verification of hypotheses is concerned, the appeal of science is to "the perceptual occurrence of events predicted on the basis of an hypothesis" and not primarily to perceptual objects whose real nature consists in "any mere confirmation of distance experience by contact experience."⁴¹ It is conceivable that prediction and verification might occur if our perceptual environment consisted solely of distance qualities and if contact things were completely absent. But the reality of contact things is the *sine qua non* for the identification of the "exception." Mead writes:

The importance of the perceptually real thing of the manipulatory area appears when an object of this sort can be identified under observation and experiment in an exceptional instance, consider, for example, the radiation of black bodies where the reality of the object as a perceptual thing must be accepted, wholly in advance of any further interpretation of it that a later hypothesis may give. Here we reach a something that maintains itself as an object that can be felt as seen. It is further evident that the reliability of measurements—of pointer readings—must be assured within this same perceptual field. Even if we can neither spread out the space and time of this area into the Euclidean space of the Newtonian doctrine, nor subdivide its perceptual things into Newtonian mass-particles, we nevertheless in some fashion relate the assumed reality of a universe that goes way beyond the boundaries of our perceptual experience to the decisive reality of the scientist's findings.⁴²

Fifth, this metaphysical interpretation opens the door to a conception of mind which is perfectly useless to the scientist's procedure.

The door thus is thrown open to the representative theory of perception. The perceptual content of the object comes to be defined in terms of sense-data, which are correlated with scientific objects,⁴³ but have their proper locus in a consciousness, or else lie somewhere between the mind and nature.⁴⁴

There are two reasons why this "realm of consciousness" is perfectly useless to the scientist's procedure, "either in terms of consciousness or in terms of sense data."

The first is that the world which is out there in his observations and experiments is the world of reality. No satisfactory line can be drawn that will

⁴¹ *Ibid.*, p. 149.

⁴³ I e., the invariable structure of space-time

⁴² *Ibid.*

⁴⁴ *Ibid.*, pp. 151 and 152

leave what is real for him on one side and sense-data on the other. . . . The other reason is that so-called consciousness has now been brought within the range of biologic science. Mind can no longer be put outside of nature.⁴⁵

12. Consider Mead's alternative interpretation of the space-time formulas of relativity. Mead, as we have seen, is clear that the formulas do describe the uniformities of events and must be accepted, regardless of what metaphysical interpretation be given to scientific objects, inasmuch as the formulas are the only form which the scientist can give to his observed events.⁴⁶ He is equally clear that the form of these relations will not fit an invariant content of Newtonian mass bodies. Consequently, the real existence of the mathematical form of nature is inconsistent with the existence of perceivable things which have invariable mass properties. However, it is not necessary to assume that the formal structure of space-time must be a hypostasized reality transcendent of perceivable things, provided we reconstruct our notion of things. The formal structures of science become the formal structure of perceptual things provided we assume that the "sociality of thought," which "Newtonian relativity . . . confined to thought . . . is also a characteristic of nature."⁴⁷ "Sociality," says Mead, "is the capacity of being several things at once."⁴⁸ Everyone is familiar with the fact that in thought one can be both a buyer and a seller, a teacher and a pupil, at rest or in motion, and one's being any one of these is dependent on one's being the other at the same time. Sociality as a general characteristic of material things means that the mass and energy dimensions of things are one quantity

⁴⁵ *Ibid.*, p. 152

⁴⁶ "I assume . . . the scientist is seeking for what is permanent, that he finds this in the uniformities of the processes, that it is in terms of these uniformities that he defines his objects, and that this therefore is what he means when he speaks of conceptual objects" (*ibid.*, p. 151)

⁴⁷ This does not involve the idealistic position that nature is "objective mind" or presupposes mind. Mead's position is that sociality is a general property of a system of things but becomes the form of the mind only when in the course of evolution it "gets into the separate individual." It is not our purpose, however, to expound at the moment Mead's analysis of the genesis of mind in the individual.

⁴⁸ *Ibid.*, p. 49

in one system of things at rest, while at the same instant they are a different quantity relative to another system of things ("consentient set") in motion, and that what the quantities of things are in any one system is dependent on what their quantities are in another system.

Relativity reveals a situation within which the object must be contemporaneously in different systems to be what it is in either. The experimental proofs of relativity all come back to such situations.¹⁹

This assumption of the sociality of perceptual things conforms with the process of measuring the mass characters of things as they exist simultaneously in different perspectives.

Presumably objects in motion with reference to us have different values spatially, temporally and in terms of mass from those at rest, and if we are to measure them as we measure objects at rest about us we must isolate the common feature—viz, the relational character of space and time common to the two situations of rest and motion. The expression of this common feature in the transformation formulae that Laarmor and Lorentz worked out in order to give invariance to the Maxwell equations carries with it most interesting implications, especially with reference to the constant velocity of light, but it does not change the fact that what is going on is measurement in one situation of something whose measurable characters are partly dependent upon the fact that it is in another situation as well. It does not carry with it the necessity of setting up a space-time realm. The postulation of such a realm rests upon the assumption that because the same object may be dealt with either as at rest or in motion, it must therefore be affected with the coordinate of time in the same fashion in each situation.²⁰

13. To sum up this part of the Introduction: the relation of scientific objects to experienced things is essentially the question of whether the most general characteristics (i.e., spatiotemporal characteristics) are common to both types of objects. We know that experienced things are spatiotemporal as expressed in terms of our responses to them, that their resistant phases are constant with respect to passing (temporal) phases of our responses and with respect to the correlative passage of the distance qualities of things. But in our experience we never reach a point where perceptual things are not both spatial and temporal, i.e., are not resistant volumes with distance qualities.

¹⁹ *Ibid.*, p. 63

²⁰ *Ibid.*, p. 155

Newtonian thought defined real existence as invariant mass forms and hence excluded perceptual things from membership in the world of nature. Relativity physics led to scientific objects which are only formal, i.e., which consist simply of invariant space-time structures whose intervals give the spatio-temporal distance between perceived events. Existence cannot consist of material bodies invariant for all reference systems. One can assert that reality consists of a hypostasized structure of space-time which transcends experienced things, leaving them to the realm of mind. Or one can interpret perceptual things as having a social character (as previously defined) so that the logical structure of space-time becomes the form in which mass dimensions of things exist in different systems of reference. The intelligibility of either position certainly depends on its self-consistency. But the choice of either assumption is further determined by the assumptions of practice. Our research behavior with perceptual things accepts their reality without question, and, consequently, if reason starts with its own assumptions in practice, then consistent deduction must conclude that scientific objects and objects of experience are members of a common nature only if perceptual things are social and if both scientific and perceptual objects are spatiotemporal. And from this point of view the metaphysical separation of scientific and perceptual objects falls to the ground. Scientific objects are constructions and idealizations from perceptual objects when attention is paid to the features of these objects relatively invariant with respect to various reference systems—features which are most easily isolatable in the manipulatory phase of response and the corresponding contact phase of perceptual objects.

III. COSMOLOGICAL IMPLICATIONS

14. In *Mind, Self, and Society* Mead develops the thesis that mind is essentially social and that no mind could emerge except in a social group of individuals. An individual of such a group is social in so far as he is able to take the role of other individuals, and he does this on the basis of language, by which he is able

to call out in himself the same responses that he evokes from other members of the group. In so far as the individual is thus able to prewise the responses that his behavior calls out in others, he takes their role and gives evidence of his social status. What is strikingly unique about Mead's social theory is that it expresses the nature of the self and of mind in terms of co-operative action and interaction between and among individuals. For Mead mind is not considered as an independently existing entity. That is to say, mind does not exist independently of social intercourse. Language, which makes possible the taking of the role of others and thereby lays the basis for the emergence of mind, develops solely by reason of an attempt on the part of individuals to complete acts already initiated at a biological level. Language, or gestures which call out common responses from different individuals, is a means of directing concerted action.

From Mead's account of the nature and the origin of mind and human society, we can see that he has employed successfully concepts which had previously been employed by the physical scientists. Some of these concepts should be called to attention here with the view of explaining later precisely where in Mead's social theory is related to his cosmological views.

In developing a statement of the conditions necessary for the emergence of human society, one must go back to a physical and biological world which did not contain human society. The physical scientist tries to present to us a world free from personal or social bias - a world complete in itself independent of the human mind. The problem of showing how the human mind and society emerged (with the physical and the biological systems as a condition for their emergence) is treated by Mead in connection with the emergent and creative advance of nature.⁵¹ Mead does not explain mind or human society by reducing them to the conditions necessary for their emergence, for this would

⁵¹ See A. N. Whitehead, *The Concept of Nature* (Cambridge, 1920), p. 178; also Mead, "Objective Reality of Perspectives," *Proceedings of the Sixth International Congress of Philosophy* (1926), pp. 82-83.

be a denial of emergence. Yet Mead recognizes the necessity of the conditions for the emergence of mind and society, and in doing so he acknowledges the *process* of emergence—the interval between a system necessary for the emergence of another system and that other system

An emergent in its social character belongs to two or more systems at the same time.⁵² The two or more systems to which an emergent belongs are interrelated in the sense that systems which arise after others are dependent upon those others for their existence. Thus a biological organism belongs to at least two systems, the physical and the biological, and the latter is dependent upon the former for its existence. But an emergent is also social in that “the novel event is in both the older order and the new which its advent heralds.”⁵³

Thus, according to Mead’s interpretation, emergence, sociality, and noncausal⁵⁴ relations are closely related. In general, Mead attempts to show how two or more orders of nature are interrelated in such a manner that a given event can be a member of all these orders at the same time. In *The Philosophy of the Act* Mead emphasizes the process of emergence itself and shows what part the future event, or that which when it arises is called an emergent, plays in determining the new system which the emergent brings with it. That is, Mead is inquiring into the nature of those systems which arise upon the emergence of events determining them. Again, he is inquiring into the nature of the environment which arises with the emergence of the form, such as a biological form, the human mind, and human society.

In the human social system the same person may assume the role of two or more individuals by taking their attitudes. In

⁵² See Mead, *The Philosophy of the Present*, pp 69 ff , and this volume, Essay XX.

⁵³ See *The Philosophy of the Present*, p 49

⁵⁴ Mead has really two uses of “causality”—a mechanical and a nonmechanical. The former is not connected with emergence or novelty but is restricted to repetition of the old, whereas nonmechanical causality refers to adjustment to novel situations wherein the oncoming event controls a present process. Sometimes Mead speaks of emergence as noncausal in the mechanical sense.

taking the role of others, an individual may enter into directed concerted action with them; that is, he may enter into a common social act with those others whose attitude he has taken. But the problem is more general than that of showing how human society is possible; it is the problem of showing what sort of a physical, biological, or cosmological environment emerges with the emergence of the human mind and human society. Admitting that there are natural conditions preceding the emergence of mind, what sort of environment arises upon the innovation of the human mind and reflective thinking? What is the nature of the purely physical world independent of the human mind, and in what ways is the physical world different because of the presence of mind? Whitehead speaks of the knowledge of a nature "closed to mind,"⁵⁵ but Mead assumes that thinking makes a difference in the order of natural events, which is consistent with his general assumption that the form and its environment emerge simultaneously. This is the problem of the organization of perspectives. As Mead says, "The undertaking is to work back from the accepted organization of human perspectives in society to the organization of perspectives in the physical world out of which society arose."⁵⁶

In dealing with the organization of perspectives, be it that of inorganic phenomena, organic phenomena, or reflective

⁵⁵ *Op cit.*, p. 4. Mead's writings refer to Whitehead's earlier works but do not refer to *Process and Reality*. For the most part we shall discuss Mead in connection with Whitehead's earlier views. It seems that *Science and the Modern World* represents a transition in Whitehead's thinking from his treatment of nature in *The Concept of Nature*, *The Principle of Relativity*, and *The Principles of Natural Knowledge*, to *Process and Reality*. No doubt Whitehead inclines much more toward idealism in *Process and Reality* than would be expected of an out-and-out realist (see *Process and Reality*, pp. vii and viii, where Whitehead admits that the results of *Process and Reality* are closely akin to Bradley's views.) In fact, there is much more of "mind" in nature according to Whitehead's later views than would have been admitted earlier. In *Process and Reality* the "subjective aim" of each actual occasion envisages eternal objects as possibilities for actualization. Such an envisagement, which actually determines the nature of the superject (the actualized subjective aim) has quite a part in determining what actualizations are to emerge and, consequently, the nature of the manner in which nature is to be stratified. For a treatment of the role of mind in *Process and Reality* see C. W. Morris, *Six Theories of Mind* (Chicago: University of Chicago Press, 1932), pp. 182 ff.

⁵⁶ This volume, Essay XXXI, p. 606.

thinking, Mead makes use of principles employed in accounting for the emergence of mind and human society, and also of principles which are useful to the physicist and the biologist. That is, he makes use of the concepts of sociality, of dynamics, and of evolution. The principles of dynamics and evolution should be explained here in order to bring out the contrast between the philosophy of the act and a more or less static philosophy of certain past and contemporary philosophers. Evolution, emergence, dynamics, process, and sociality characterize Mead's cosmological views. Let us explain the principle of dynamics and the principle of evolution with a view of showing how they are effectively applied in Mead's cosmological views.

15. Renaissance students of mechanics, who were in a sense philosophers also, believed that there are two kinds of forces, *vis mortua* and *vis viva*, dead force and living force. To those thinkers these concepts were not altogether clear, nor did they see a possible connection between living and dead forces, and to that extent these forces remained incommensurable with each other. For the most part, however, *vis mortua* was a concept of bodies in equilibrium, and in philosophic terminology it implied that a body possessing such force is complete in itself independently of any other body, i.e., the weight is *in* the body. *Vis viva*, on the contrary, was a concept developed by Renaissance thinkers and has now become fundamental in explaining the actual nature of the physical world. The modern terms for these two concepts are "statics" and "dynamics," respectively. More precisely, "statics" represents the world at an instant and potentially, whereas "dynamics" represents the actual world and stresses the interrelationship and the interdependence of the parts within a given system. As Professor Whitehead has well brought out, the world at an instant is an abstraction, whereas the actual world must be explained in dynamic terminology.⁵⁷

In accordance with contemporary physics, Mead has been

⁵⁷ *The Principles of Natural Knowledge*, pp. 2 and 7, *The Concept of Nature*, pp. 56 ff., *The Principle of Relativity*, p. 7, and *Science and the Modern World*, pp. 74 ff.

able to express the nature of the world and its contents in terms of dynamics. The principle of dynamics stresses not only the interdependence of members of a common system but also the place of process in phenomena. Thus, in order to account for the nature of a biological form, Mead brings in the environment of the form and stresses the interrelationship and the mutual interdependence of the form and the environment for their existence. An attempt to explain either "as such" and in separation for the other would result in a static, inadequate explanation, but an explanation of the process going on between the form and the environment characterizes a scientific account of the actual nature of each. Mead's use of the word "social" in this connection is more inclusive than "dynamical" and opens the way for one of his most fundamental concepts, namely, the organization of perspectives. Mead's view denies the reality of mind as such in separation from action or from social co-operative processes. Role-taking, which is an ideational process, has its seat in an acting biological form, which in turn involves the inorganic world. Reflective thinking, role-taking, is in itself an emergent of the highest order and involves the three major systems of reality: the inorganic, the organic, and the human social system. By this social interpretation of the emergent, and especially of mental phenomena, Mead escapes a metaphysical dualism. As will be explained more fully later, role-taking is a process of passing from one perspective to another ideationally, and just as each level of perspectives or each order of phenomena is metaphysically real, so there are several, in fact many, perspectives, no one of which is all-inclusive. In this sense Mead advocates pluralism in contrast to dualism or monism. The philosophy of the act carries over into human social theory and into cosmological problems the cardinal principles of dynamics and emphasizes the interdependence of individuals for the development of mind even as the properties of physical bodies depend for their existence upon the presence of other bodies; that is to say, upon the presence of an environment. The what the mind is, then, and its so-called "capacities" (potentialities)

must be expressed in terms of dynamics, in terms of social action, and reflective thinking and the development of the self consist in the organization of perspectives.

So closely are the principles of dynamics related to the principles of evolution that they can be separated only for purposes of discussion. Although Mead often gave expression to his thought by using biological terminology, he was probably influenced more by the general principle of evolution, that of continuous orderly change, than by specific biological facts. The principle of continuous orderly change, expressed by the seventeenth-century scientist, in essence emphasizes the reality of process as over against the reality of the changeless, the static. Differential and integral calculus are means of dealing with change and processes, and the fact that motion lends itself to precise mathematical treatment adds weight to the theory that change is objectively real.

Not only do the general principles of evolution imply the reality of change but they also imply the genuineness of emergents. A recognition of emergents puts in question the adequacy of a mechanistic statement of change, for the latter tends to interpret emergents in terms of the conditions necessary for their emergence and does not consider the import of the emergent in effecting new orders of events (new laws of behavior definitive of the phenomena in question). One of the essential problems with Mead is to account for the process of emergence by some other means than that of efficient causes alone. Mechanism, which makes use of efficient causes alone, cannot account for process, for a process, if it is objectively real, must include both past and future. In fact, Mead contends that past and future are brought together 'in a present by way of processes. The complement to this problem is that of explaining the nature of the perspectives which are associated with a given emergent.

The epistemological view of Plato's earlier writings that the changeless alone is real and knowable, coupled with the historical development of the Aristotelian axiom of the immuta-

bility of essences or essential forms upon which the traditional subject-predicate logic is based, left little room for the recognition of the epigenesis of new forms, or for the place of novelty in metaphysics. This type of Greek thought found its way into the scientific thought of the seventeenth century. It was expressed by the phrase, "there is nothing new under the sun," and was more precisely formulated by the conservation doctrines, such as Descartes' doctrine of the conservation of motion and Leibniz' doctrine of the conservation of force. That is, for the early modern scientific thinkers, in so far as the physical world is knowable it is eternal. This view, as suggested above, was, in part at least, an outcome of Greek epistemological and metaphysical assumptions. The doctrine of the immutability of reality, when applied to the physical world, led to what we have called conservative doctrines, or to conservative systems. Such a system (i.e., as in the theory of the conservation of energy) need not deny the presence of some sort of change within the system. Rather the import of a conservative system for science is that any cause within such a system produces its entire effect within that same system and any effect within such a system has its entire cause within that same system. A confusion of thought arises when the conservativeness of the physical world is stressed alongside the theory of evolution. One cannot admit the genuineness of epigenesis and yet reduce the new form merely to a part of the conditions necessary for its genesis.

Mead has accepted the scientific tenet that natural effects have only natural causes but has rejected the unwarranted mechanistic assumption that, consequently, every effect can be reduced to its causal conditions. The pragmatic theory of knowledge which admits action into knowing similarly eliminates the conservative element in epistemology. This view, of course, is in accordance with the belief that novelty or emergents are not fully predictable on the basis of a knowledge of the world before their emergence. Furthermore, Mead contends that the emergent itself effects an environment which, therefore, could not be known before its emergence. He acknowl-

edges the principles of evolution and the processes implied by those principles, and he denies the validity of the doctrine that knowledge consists of an awareness of subsistent eternal (static) relations or of a passive relation of mind to the external world as found in sense awareness. For him knowledge consists of the process of co-ordinating perspectives.⁵⁸ Hence knowledge, meanings, judgments, and hypotheses are expressed in terms of dynamics—in terms of co-operative, directed action. Thinking, whose function is to aid the process of adjustment to novel situations when the process of the organism is endangered, consists in passing ideationally from one perspective to another and in seizing upon the process into which both the form and the environment must enter if harmony is again restored. In brief, reflective thinking consists in communication, in role-taking, wherein the individual form assumes the attitude of the group, a generalized other, and it is this common perspective, common attitude, which is the universal in the philosophy of the act. The forms of knowledge consist, then, not of static subsisting relations or of Platonic eternal objects but rather of tested hypotheses. The testing of a hypothesis consists of an act which unifies the various perspectives of which statement is given in the hypothesis itself. Perspectives are united through action, and action is essential to the scientific verification of hypotheses.

Thus it becomes clear that Mead's social theory rests upon the same basic scientific principles as do his cosmological views. There is no gap between his social psychology and the philos-

⁵⁸ The meaning of "perspective" often varies with the writer. In ordinary conversation it usually means "point of view." Thus, when one is able to look at a penny from two or more points of view, one may be said to have two or more perspectives of the penny. In Whiteheadian terminology, nature or the Minkowski four-dimensional world of events lends itself to stratification, to the ingression of alternative space-time systems or to consentient sets of events open to sense awareness in a situation called "cogredience" wherein the percipient event prescribes the here and the now (reference system) of that consentient set of which the percipient event is itself a member. Consequently, each such consentient set of events (see *The Principles of Natural Knowledge*, chap. III) is analogous to viewing events and their relative order from a definite, natural standpoint. Such a consentient set, according to Whitehead, is objective and absolute in the sense that it is open to sense awareness and independent of interpretation or any mental entanglements. That is, relative to the percipient event it is absolute in the Newtonian sense (see *ibid.*, pp. 34 f., and *The Concept of Nature*, p. 105).

ophy of the act. Indeed, social terminology is often employed in dealing with such problems as the nature of emergents, the objective reality of perspectives, and the implications of the theory of relativity. In Mead's emphasis on the social nature of phenomena, he has brought out the full implication of dynamics and of the process of adjustment, as expressed in evolutionary change. The concept of sociality, when applied to organic forms lower than man, and finally to inorganic processes, both elucidates the scientist's treatment of these phenomena and explains the interrelationship of inorganic, organic, and human social processes. Yet the very meaning of sociality is based primarily on scientific postulates (especially the postulate that the causes of natural phenomena are themselves natural, which leads to the postulate that bodies interact or enter into common processes as expressed by the words "dynamical relation"), and both Mead's social and cosmological views represent an attempt to develop the implications of scientific methodology. Knowing, meaning, and hypotheses are defined in accordance with scientific principles, and scientific experimentation is expressed in terms of action. It is in this sense that the principles of dynamics and evolution have come to fruition in Mead's epistemological and cosmological views.

Our problem now becomes that of presenting Mead's explanation of the relationship of perspectives and emergents and of the organization of perspectives.

16. The new theory of physical relativity must be taken into consideration in treating motion or processes. Probably if the physicist or the relativist with a realistic background were successful in presenting to us a world free from what we have called emergents and (according to him) free from all biased interpretations and from all subjectivity, it would be similar to the Minkowski world of events in which there would be no definite space-time systems whatever. Such a world might be presented as a congeries of electrons and protons each with its field of force, but there would be no sun, no earth, nor anything by means of which we could establish alternative space-time sys-

tems If this were the case, what would be the basis for the objective reality of space-time systems? Can our present planetary system be said to belong to that Minkowski world alone? Without bias, how is the Ptolemaic or the Copernican world-view to be explained; i.e., in what sense may they be said to be objective? These questions, Mead contends, cannot be answered adequately by use of the mechanistic interpretation alone, or yet by accepting the Minkowski world of events as ultimately real and as the object of knowledge. In fact, the mechanistic interpretation of change denies emergence, and, similarly, the Minkowskian interpretation reduces time to a dimension, thereby explaining novel events, thanks to which there is time, as superficial differences in perspectives behind which the relativist looks for sheer identities as expressed in mathematical equations. Mead believes that durations, or what psychologists have called a "specious present,"⁵⁹ have past, present, and future in them and that mechanism recognizes only a knife-edge present. The past and future, however, cannot be brought to bear on explanation unless the future is there as a determining factor in that process. That which is still in the future is the emergent, and yet it enters into the present process.

The mechanists believe that the present is extensionless, or is without parts even analytically. Yet they hold that such a present is real and complete in itself. It is clear, however, that processes cannot be built up out of such timeless, self-sufficient presents. Rather a process must have temporal extension, though that extension may be very short. Whitehead has well expressed this by explaining that even an atom of iron requires time for its existence. Also, as shown in the epochal theory of time,⁶⁰ Whitehead holds that temporal phenomena (events) happen as wholes which are actually indivisible but divisible for

⁵⁹ A biological specious present is the minimum time required for having sense experiences, but the content of such experiences is emphasized when we contrast a biological specious present with a psychological specious present. The former contains sensations temporally and physically present, the latter may contain, ideationally, things not physically present but physically past or future.

⁶⁰ See *Proceedings of the Sixth International Congress of Philosophy* (1926), pp. 59 ff.

methodological purposes only. In speaking, then, of the control exercised by the future event, Mead probably means that even in the simplest type of emergence (in inorganic processes) the factors which are past, present, and future from an analytical or from a mechanical point of view are actually fused or interpenetrated in such a manner that they are all necessary to the ongoing process. However, to impute consciousness or teleology to low-grade processes is unwarranted, and it is only when one is able to assume different roles that the presence of reflective thinking and teleology is assured.

In the Minkowski world of events there is no heterogeneity; there are no emergents. The problem of accounting for processes which result in the actualization of emergents becomes critical. From a purely mechanical point of view, there is simply change—a change of the position of immutable elements—but such change cannot result in genuine novelty inasmuch as space is homogeneous, i.e., makes no difference to the internal constitution of that which is “in” it.

Can we begin with a Minkowski world of events as a condition for differentiation and the emergence of new forms and say that “eternal objects” such as “stars” and “satellites” and their motions ingress into that world, thereby assuring the objective reality of alternative space-time systems? Whitehead seems to think so, but Mead maintains that Whitehead’s so-called “eternal objects” (such as “blue,” “pyramid”), emerge with the emergence of new forms and that these same objects may submerge upon their disappearance from the actual world. That is, Mead attempts to account for emergents not by defending the Platonic view that they are eternal in the heavens but by processes in which the past and the future mingle in the present. Once an emergent arises by whatever process, it conditions the emergence of still other novelties. The mental process, Mead believes, is essential to the emergence of the Ptolemaic or the Copernican systems, since and inasmuch as each of these systems implies a statement of experience to be expected from different points of view. Intelligence is creative and determines

new orders of events which would not have taken place without it. Mind is not passive. It does not merely behold eternal forms. It proposes plans of action, hypotheses, which actually determine new orders of events. Apparently Whitehead does not account for the process of ingression as such, and to that extent he explains "the progressive integration of nature"⁶¹ in static terminology; but it is precisely the emergent process which Mead wants to account for in the philosophy of the act.

Processes, which have past and future in them, are, according to Mead, necessary for emergence. The bringing together of past and future may be generalized and called the organization of perspectives. When the flower turns its face toward greater light, the future is there as a controlling factor, and the past is there as a condition for the whole process. The flower is selective, constitutive of, and causally related to, its environment. The light is what it is because of the presence of the flower. In fact, Mead says, "In the twisting of a plant toward the light, the later effect of the light reached by the twisting controls the process."⁶² In the process of adjustment to an oncoming event,

⁶¹ Whitehead assumes that God is "the principle of concretion." God is the ground for the rationality of becoming (see *Science and the Modern World*, pp. 250 ff.) An eternal object is not *in* time or *in* space in the literal sense. Rather an eternal object has the continuous status of potentiality for becoming actualized. That which becomes actualized (what may be called an emergent) represents a togetherness of eternal objects, but no eternal object is new. In this sense it seems that the process of the ingression of eternal objects into events is not altogether explained on a natural basis. Also, it is doubtful in Whitehead's system whether a togetherness of eternal objects could effect novelty—an epigenesis of form.

In Mead's system identities or universals are the common elements found within a perspective or between various perspectives. These common elements are manifested when an individual is able to carry out a purposive act or when several individuals are able to assume the role of each member of the group and thereby to unite in concerted action, resulting in a common goal. In general, with Mead, universality is a property of common responses or of objects answering to common responses, whether the responses are social or individual.

⁶² See this volume, Essay XX, p. 340. It is not always easy to discover in Mead's writings to what extent final cause enters into his cosmological views. At times he leaves with the reader the notion that role-taking occurs below the symbolic level. It does not seem, however, that Mead believes that a process controlled by an oncoming event necessarily involves role-taking. At any rate, such control does not involve conscious behavior or an intellectual awareness of the consummatory phase of the process. Rather Mead seems to hold the view that a process actually contains both past and future in it and that a knife-edge present is an abstraction owing to an analysis

the form and its environment merge in that process and are not clearly differentiated. It is the process itself which effects the emergent. In a Minkowski world of events accounted for by a purely mechanical statement, there is no process. As previously mentioned, the physical sciences have made use of the concepts of "dynamics" and "process," but these concepts are logically inconsistent with the mechanical view which tries to construct the world out of elemental, analytical parts. Physicists must give up either the mechanistic interpretation or the dynamic interpretation which supplements the concept of process. Mead believes we must give up a completely generalized mechanism; he has shown that the principle of sociality is presupposed in the modern dynamical interpretation of the world and that such mechanism is based on an atomic static doctrine, ultimately denying the reality of processes and emergence.

An adjustment presupposes process, is a result of selection, and in general is due to the organization of perspectives. The bee and the flower each have a (nongenerative) perspective. One receives pollen, the other honey. Each stratifies nature in a certain way such that nature would not be what it is without them. But these stratifications of nature intersect and become organized in the life-processes of both the bee and the flower.

A higher type of organization of perspectives is effected when we are able to account for the objective reality of alternative space-time systems, and when we are able to propose transformation formulas by means of which we might anticipate experiences to be had in a system other than the one in which we are now present. Such an organization is possible, Mead believes, only if an individual is able to take the role of another in another reference system. This is possible only at the level of role-taking and reflective thinking.

17. In *The Philosophy of the Act* it is a conspicuous fact that Mead is dealing with the same problems as those treated by

of the process for methodological purposes. In this respect Mead's conception of a specious present and of processes in nature are strikingly similar to Whitehead's epochal theory of time.

Whitehead and certain contemporary realists. These common problems have arisen out of the general theory of evolution and the theory of relativity. One of the essential problems emerging from the theory of relativity is that of accounting for the objective reality of motion and change. Many have questioned the objective reality of change and have held that change is actual only from a particular space-time reference system which is chosen at will quite arbitrarily. Those who hold such a view set up mind as a cause of alternative reference systems but, for that reason, hold that these systems are merely subjective. Whitehead, in his earlier works, attempted to account for the objective reality of alternative systems free from any mental entanglements whatever. He attempted, in the light of the theory of physical relativity, to present a world "closed to mind." According to his earlier works, he set up the percipient event, the bodily organism, as a condition for the ingression of alternative orders into the Minkowski world of events, but mind was not itself to be considered one of the conditions. Obviously, Whitehead was attempting to evade the "egocentric" predicament, but he left no function for intelligence save the passive observance of eternal forms which had somehow ingressed into nature.

Whitehead attempts to give an empirical account of both rest and motion⁶³ and holds that both are open to sense awareness in a situation which he calls "cogredience."⁶⁴ Cogredience is a situation in which the percipient event (the observer's body—not his mind) is at rest absolutely with respect to a consentient set of events which delineates a specific space-time system. In fact, the Whiteheadian theory of motion, rest, and consentient set of events is based on the assumption that rest, motion, and change are ultimate facts of nature and that each specific time system is, therefore, absolute in the Newtonian sense—each is a miniature Newtonian system.

Of course, there are alternative space-time reference systems

⁶³ See *The Concept of Nature*, pp. 105, 188–89, 192

⁶⁴ *Ibid.*, pp. 108 ff., *The Principles of Natural Knowledge*, p. 79

in Whiteheadian cosmology, and the problem of getting from one to the other immediately arises. The different solution of the problem of inferring the order of events in alternative space-time systems distinguishes the earlier realistic approach of Whitehead and his followers from the pragmatic approach of Mead. Mead explains that the realistic approach is a static approach based on a static epistemology which rests on the assumption that the objects of knowledge are eternal. Mead's approach to this problem is the dynamic social approach previously indicated. It considers the actual process by which we get from one perspective to another and shows wherein the oncoming events control that process. Let us explain these different views more thoroughly.

Whitehead's early writings, *The Principle of Relativity*, *The Principles of Natural Knowledge*, and *The Concept of Nature* are designed to bridge the gap between the world of sense experience and the physicist's world of abstract concepts such as those of "space," "time," and "the world at an instant." The method of extensive abstraction is the special technique by which Whitehead arrives at abstract concepts by beginning with sense data. In the beginning of the process of abstraction Whitehead assumes that all sense data of which one is actually or potentially aware during a specious present of the percipient event are simultaneous with the percipient event and constitute a concrete slab of nature—a duration. Thus a concrete slab of nature, or events contemporary with one another, is unlimited spatially and limited temporally by being simultaneous with a given event. Durations which belong to the same time systems are parallel—they do not intersect; that is, no event in a given duration is simultaneous with an event in another duration of the same system. However, slabs of nature, durations, of alternative time systems are not parallel but intersect; that is, they have events in common such that these common events are simultaneous with events some of which are in one time system, some in another.

Whitehead's organic philosophy emphasizes the interrelation-

ship of time systems and in realistic fashion maintains that a given time system contains in a sense all other time systems.⁶⁵

Position in space is merely the expression of diversity of relations to alternative time-systems. Order in space is merely the reflection into the space of one time-system of the time-orders of alternative time-systems.⁶⁶

From this position Whitehead comes to the general conclusion that a detailed analysis of a given spatiotemporal reference system will reveal the orders of events found in other such systems inasmuch as the former is actually constituted of the latter. All these orders (systems, durations, moments, etc.) are natural and objective—-independent of mind—and an analysis of that which is disclosed to sense awareness will reveal relations found among alternative orders. Also the ultimate relations in the world are mathematical relations, and our knowledge of them is based on sense experience. It is precisely at this point that Mead differs from Whitehead and his followers.

Mead does not assume, as do Whitehead and his followers, that a knowledge of the nature of alternative perspectives⁶⁷ is revealed through an analysis of sense data within a given perspective. Rather he holds that data found in one perspective or in one reference system are indicative of data to be found in another, but such indicativeness involves reflective thinking, memory, anticipation, inference, and prediction. Any living form which selects certain stimuli and on the basis of that selection adapts itself to an oncoming event enters into a process which stratifies nature. This process need not be cognitive, and indeed in Mead's opinion it is not cognitive save in human experience. Now in reflective thinking the human being is able to predict the data to be experienced later by use of the senses at a purely biological level. But the prediction of future experiences requires an organism which enables an individual to hold

⁶⁵ See *The Principle of Relativity*, chap. 11. Cf. also, *Science and the Modern World*, pp. 133 and 152, and *The Principles of Natural Knowledge*, p. 13.

⁶⁶ *The Principle of Relativity*, p. 8.

⁶⁷ Here "alternative perspectives" may be interpreted to mean alternative space-time systems from which one might measure velocities, directions, etc.

within a single conspectus of thought the various biological perspectives, none of which is contemporary with any other. Reflective thinking, then, may properly be called the symbolic organization of biological perspectives. The purpose of reflective thinking is that of permitting an already initiated process to complete itself. In reflective thinking hypotheses are determinants of the order of the future events deemed suitable to the full release of the process already begun. If a hypothesis is true, it permits the continuation of impeded processes, and by following the plan of action (the instructions of which are contained in the hypothesis) the various perspectives are brought into a single process—a unity.

With respect to alternative space-time systems, transformation formulas are meaningful only in so far as the perceiver (the percipient event) is able to take the role of an individual in another frame of reference. From this it follows that contemporary physical theory presupposes a social interpretation of formulas or hypotheses. The signification of particular data, then, is formulated in a hypothesis which is a plan of action prescribing that process deemed suitable in connecting alternative perspectives. If one follows the instructions of a hypothesis, then its function is to connect the various perspectives into a unity. But in human behavior an anticipated perspective controls the process which so unites them.

An understanding of a hypothesis, that is, an awareness of its signification, requires that an individual be able ideationally to view several biological perspectives within a single conspectus of thought. That is, a psychological specious present (a mental act) may contain ideationally several biological specious presents (acts at a lower level). But the ideational presence of several biological specious presents within a single conspectus of thought is made possible not because one biological specious present necessarily contains another and is composed of the other but rather because man is able to take the role of several percipients at the same time—i.e., in a single psychological specious present, several biological specious presents are repre-

sented ideationally. On the basis of sociality or the ability to be several things at once (in this case, the ability to be both a biological form and to assume roles), man is able to prewise the consequences of an act or to prewise the import of physically present perspectives, that is, to prewise future perspectives. More generally, man is able ideationally to be several perceivers at the same time. Thus, the meaning of physical hypotheses depends upon the social nature of man—upon creative intelligence. In reflective thinking a hypothesis is set up which contains not only instructions of procedure in carrying out an act of adjustment but also the terminus of the act; that is, it contains an expected event, the oncoming event, and this event serves as a control over the entire act which is rendered into a process by virtue of the oncoming event which controls the various phases of the act and unites them into a meaningful whole.

In his earlier writings Whitehead attempts to account for the objective reality of perspectives, and of alternative space-time systems, by showing that through an analysis of sense data in any one perspective all other perspectives are revealed. Analysis will reveal or signify other perspectives because they are actually constitutive of one another.⁶⁸ Analysis, of course, does not add to the contents already there, and mind, therefore, makes no difference in the nature of things analyzed. The alternative orders of events are, consequently, objective and free from mind. An awareness of a particular reference system is assured in a cogredient situation. It is detected in an act of awareness. Thinking, then, does not effect a different natural environment from the one already there before the mind is aware of that environment. In Mead's view, analysis is synonymous with breaking up an act, and knowing is synonymous with reconstruction, with forming hypotheses from parts of acts so analyzed. Knowing, therefore, always presupposes a problematic situation, and inferences are accepted hypothetically.

Mead maintains, therefore, that alternative orders of events are not constitutive of one another but are actually a result of

⁶⁸ See *The Principle of Relativity*, chap. 11

the innovation of reflective thinking. The mind does not create the events themselves, but it effects an order which would not have arisen in the absence of reflective thinking. Mead writes:

The world that is there, this slab of nature, is there because of the teleological determination of the individual. If we call it "experience," it is not a subjective experience of the individual. On the other hand, the causal structure of the set or environment that is selected in no way determines the selection that is made. At the future edge of experience we project the causal mechanism into the future, but always as the condition of the future that has been selected, not as the condition of the selection.⁶⁹

Accordingly, the emergence of mind effects alternative orders of events in nature. But we have yet to show how in the world of immediate or biologic experience, wherein space and time are fused and in which definiteness of temporal sequences of events is entirely lacking, time and space can be separated. That is, we must yet show more precisely the exact function of intelligence in separating time from space.

18. Whitehead, as explained above, holds that space is separated from time in cogredience. In a cogredient situation there is duration, but the relations holding between and among the events in that duration do not pass. Moments pass as in the Newtonian system, and space endures as in the Newtonian system. Yet the percipient event which is a part of that duration, and which to that extent determines its nature, is free from mind. Consequently, Whitehead's account of the objective reality of stratification of nature in his earlier writings does not include selectivity of the oncoming event. His account of the creative advance of nature fails to include mind as one causal factor in the determination of that advance.

In contrast to the Whiteheadian theory that space is separated from time in cogredience (which involves the observer's body only), i.e., in a situation in which moments pass whereas space endures, Mead develops the thesis that time is separated from space when in reflective thinking man is able ideationally to hold on to a distant (temporally future) object as a controlling factor in conduct in the solution of problems. Mead

⁶⁹ This volume, Essay XX, p. 348

often speaks of this mental process as the collapsing of an act. In this sense the space in which the act takes place endures, whereas the moment in which corresponding phases of the act take place passes. Thus, through the formulation of hypotheses, plans of action, man is able to separate time from space. The hypothesis itself prescribes the space in which the act takes place, and that space must endure long enough to permit the confirmation of the hypothesis. It is in this respect that a psychological specious present includes several biological specious presents which are temporally separated. The separation of space and time or the construction of a timeless space is possible by setting up hypotheses which prescribe a field of action—a field which does not pass while the act is being carried out. In this account of the separation of space and time the principle both of dynamics and of evolution find their place. Mead writes:

A living individual is one that lives in the future, i e , it is sensitive to that which controls the expression of its impulses, its life-process. Now in the experience of such an individual there can appear a timeless space. A timeless space is one in which abstraction is made from the time dimension because of the cogredience with a duration of a percipient event or individual.⁷⁰

The temporal extension of cogredience may be increased if the psychological specious present includes objects which are temporally more distant. If the individual is able to control his action by the use of a more distant future object, then that space with which his act is cogredient is correspondingly greater.

In contrast to Whitehead's view, Mead presents intelligence as an emergent which is causally related to the determination of orders of events. In a problematic situation alternative plans of action arise in reflective thinking by way of hypotheses which are designed to solve the problem at hand. As Mead explains the situation, there is nothing in the past that completely determines which hypothesis shall be acted upon, and, in the acceptance of one hypothesis instead of another, we select an

⁷⁰ *Ibid* , p 341

order of events which, upon the adoption of that hypothesis, determine a process. This process stratifies nature in a manner not possible without creative intelligence.

In contrast to a purely mechanistic interpretation of the order of events, Mead acknowledges the oncoming event as a determinant in action and thereby converts sheer action into a process with past, present, and future in it. As over against realism, Mead's pragmatic view makes knowledge a phase of the process of attaining a goal and does not assume that the object of knowledge is static or that its reality is not conditioned by the act of adjustment between the form and its environment.

An acknowledgment of the genuineness of emergents and of novel situations, coupled with the theory that reflective thinking is the process of passing from one system to another by virtue of sociality or the ability to assume different roles corresponding to the different perspectives peculiar to these systems, brings Mead to the conclusion that the objects of knowledge are neither eternal objects nor subsistent eternal relations. Mead emphasizes the place of the process of adjustment in behavior and, accordingly, considers the objects of knowledge, universals, as emerging in common attitudes or common perspectives, of which the thinker is consciously aware as he passes from one perspective to another ideationally. It is when one is presented with conflicting impulses that already initiated processes are checked, and it is here that random movement takes place in the activity of the lower animals, whereas in man reflective thinking, which consists in formulating hypotheses or in passing from one perspective to another or in formulating a perspective common to the conflicting attitudes (tendencies to act), takes the place of random movement. Of course, a hypothesis is not a guaranteed solution but only a proposed solution of the problem, and experimentation and the final acceptance of the hypothesis as a guide in action supplement reflective thinking and finally effect the co-ordination of perspectives, which may be called a creative advance of nature.

Now, inasmuch as new situations arise continually, there will

be new hypotheses answering to their demands. For example, in the case of a new disease, physicians search for the conditions under which normal biological processes may be restored, and in so doing they search into the past for the conditions under which the present malady arose so that these same conditions might be controlled, thereby resulting in the removal of the malady, and in restoring former biological processes. Similarly, upon the appearance of a new comet or a new star, astronomers search for a past with conditions necessary and sufficient for the emergence of the novel event. In turn this past is projected into the future in prediction. In general, the novel event, or the emergent, gives meaning to the past, for this past is a past *of* the emergent. Consequently, the future and the past belong to a present characterized by an emergent, thanks to which there is time. There is, consequently, neither an absolute, unchanging past nor future posited as the object of knowledge. That is, there is no final, all-inclusive, complete perspective consistent with the changeless, eternal objects of knowledge set up either by realists such as Whitehead and Broad or by certain of the absolute idealists. Rather, thinking is itself a process of passing from one perspective to another. It is in this sense that Mead's philosophy of the act is pluralistic in character, and it is in this sense that Mead denies the reality of the Minkowski four-dimensional world of events in which time loses its emergent qualities and becomes merely another dimension expressed in mathematical identities.

19. At this point it would be well to review briefly the three major types of processes, or the three levels at which the organization of perspectives is effected, namely, the inorganic, or purely physical; the organic, or biological; and the level of reflective thinking.

In considering inorganic processes, Mead emphasizes the inadequacy of the mechanistic interpretation of purely physical and chemical phenomena. A mere shift in the relative position of immutable bits of matter does not constitute a process, nor can emergents arise in such a situation. Even in the new theory

of physical relativity there is a tendency to attribute the motion of a consentient set of events to a reference system chosen at will by the observer. From another point of view, the same set of events would be at rest. Hence there is a tendency on the part of realists (especially the early Whitehead) to accept the ultimacy of the unordered Minkowski world of events and to attribute alternative orders of events to the ingression of objects determined by the position of the observer. On the other hand, Eddington's idealistic bent leads to the conclusion that alternative orders of events are determined solely by a substantial mind.

In contrast to either the realistic or the idealistic interpretation of physical phenomena, Mead holds that there are inorganic processes which give rise to emergents and which are independent of mental phenomena, but which are, according to the general theory of evolution, conditions for the emergence of reflective thinking, "in which culminates that sociality which is the principle and the form of emergence." For example, chemical processes involve action and interaction—they involve a temporal spread—and are in that sense social, inasmuch as those processes are a mingling of past and future in the present. The dynamical interpretation of physical phenomena given by Galileo leads to the conclusion that even energy depends upon an environment for its expression.

Now an inorganic body may be sensitive to stimuli, as is shown when a photographic plate responds to light. Yet a photographic plate cannot sensitize itself to light, and it has no concern for the nature of stimuli about it. If a body can sensitize itself to stimuli, it becomes a living form. The major distinction between inorganic processes and organic processes, therefore, is the ability of the latter to select stimuli which will release impulses already begun in the living form. It is when an organism is able to respond to its own states that feeling arises. Hunger is an organic state which is a condition for the selection of food, and digestion may be considered the final stage of a biological process whose initial stage is indicated by hunger.

In organic processes the temporal spread is increased over that of inorganic processes, and sensitivity and response to distant stimuli are accordingly increased. Yet with lower biological forms there is no conscious distinction between past and future, although the organism presumably may respond to its own (memory) images. But the lower organism feels its present environment (present in sense awareness) and is connected with the past through habit. Two such living forms may depend upon each other for a continued existence, even as the bee and the flower. In that case each is a part of the environment of the other, and their life-processes intersect, or have a (nonscognitive) perspective in common. Similarly, their life-processes are dependent upon inorganic processes.

In reflective thinking the organism not only responds to its own organic states but responds to its own responses. That is, the human being, because of its highly developed nervous system, is able to present to himself ideationally an entire act after the act has once been carried out and when there is a tendency to carry it out again. In other words, one can hold on to the past by employing symbols, such as those used in language, which are representative of acts. Such a consciousness of an act makes possible a distinction between past and present; and, when past action is broken up and reorganized in an attempt to respond successfully to an anticipated, oncoming event, the future likewise becomes prominent in thinking. Thus a psychological specious present may be extended into both a past and a future, and, although reflective thinking is dependent upon both inorganic and organic processes, it transcends both and is the highest type of sociality involving communication or role-taking, meaning, knowing, and inference. In fact, reflective thinking is the highest development of the general method of adaptation necessary to adjustment and the survival of emergent forms.

In this manner Mead is able to show that the general facts of emergence, dynamics, sociality, and process supplement one another. Because of Mead's treatment of these fundamental

concepts by showing that they are all phases of the processes of nature, we are justified in saying that he has formulated a cosmology.

20. In the foregoing explanations we have brought out the essential relationship between Mead's social psychology as presented in *Mind, Self, and Society* and his cosmological views as presented in *The Philosophy of the Act*. Mead's social psychology and his more inclusive views rest on the same scientific principles, and we need not suppose that his cosmology is merely a generalization of social psychology, although the development of his social psychology seems to have helped Mead greatly in developing his cosmological views. The fact of emergence is considered in all of Mead's works and is defined in terms of sociality. An emergent is not merely that which belongs to two or more systems of nature; it also actually effects an environment or an order of events which would not have been effected otherwise. Yet, because the emergent effects an environment, we should not consider that environment as a subjective aspect of the emergent as such. Rather the environment and the processes by which it is effected are objective.

Such is Mead's approach to the problem of organizing perspectives or processes into more inclusive processes. Through the organization of perspectives, which is most outstanding in human behavior and there made possible by reflective thinking, the various members of a group are able to take the role of each member of the group and, therefore, to enter into a social process—a common act directed by common motives. Hypotheses, which are plans of action devised to permit an impeded act to complete itself, contain instructions of procedure, and by following their instructions the future (that which is selected as a control for conduct) and the past are united by the act itself. Hypotheses, then, become means of organizing perspectives and of directing concerted action. Reflection, which formulates hypotheses, is to that extent creative of an order of events which is deemed necessary to complete a biological act. In the formulation of hypotheses time is separated from space in such a way

that the space lasts while the act which the hypothesis prescribes is being carried out, and moments pass even as the phases of the act. The philosophy of the act, therefore, explains the interrelationship of the emergent and the environment, the causal relationship of mind and events in nature, and the sense in which past and future are merged into a present process which further promotes the creative advance of nature.

IV. AXIOLOGICAL IMPLICATIONS

21. Pragmatism—in spite of explicit statements to the contrary—is occasionally still regarded by its critics as a doctrine which stresses action just for the sake of action, neglecting or subordinating values which many men have held dear. Mead's statement of truth in terms of the idea which makes possible the ongoing of conduct might seem to substantiate such an interpretation, as would his frequent statements of the "end" of the act in terms of contact. Actually, however, on the pragmatic position thinking is not instrumental to action as such but to consummation, to the attainment of the value characters of objects.⁷¹ What are wanted are objects of such character that they not merely release but satisfy the blocked impulse or interest, and the whole context of Mead's thought makes it clear that action does not normally stop with the manipulation of objects but passes on to their consummatory use: in the last analysis the entire world of scientific objects is an elaborate instrumentation functioning in the service of social values. Instead of sacrificing value to action, Mead's variety of pragmatism proves at the end to be a value-oriented philosophy of a distinctive sort.

In the first place, its treatment of value is entirely naturalistic. Values are characters of objects just as truly as are distant and contact qualities: they are qualities of the object in its capacity of satisfying an interest. But just as Mead insists upon the reality of distant and contact qualities at specific places in

⁷¹ For Dewey's explicit statement on this point see W. P. Montague, *The Ways of Knowing* (London, 1925), p. 135 n.

the act—avoiding thereby the realist's hypostatization of disparate realms of sensa and matter—so values as the qualities of objects in the consummatory phase of the act are not read out into an absolutistic subsistent realm whose relation to the perceptual and physical aspects of objects must remain tenuous and disquieting. On Mead's approach, no opposition in kind can be erected between the domains of value and existence. It is clear that at this point the theory has much in common with the interest theory of value developed by R. B. Perry in his volume, *General Theory of Value*.

In the next place, because of the naturalistic theory of value, Mead is not concerned with insisting that any given value structure is eternal (the recognition of emergence and process holds as well for values as for other characters of objects) but with obtaining whatever security of method in the control of value that is possible. This means the application of scientific method to values. As opposed to what Mead calls the Augustinian philosophy of history—the attempt to realize a fixed set of values—Mead's experimentalist philosophy of history frankly admits decrements and increments of value and takes for its task the maximization rather than the legislation of value. It is because values, like primary and secondary characters, are characters of objects in nature that the reflective method may be applied to them precisely as to other characters—values simply take the place of other characters as data. The task of thought everywhere is to offer a hypothesis adequate to the data; in reflection concerning values this means the search for a way of action adequate to all the values in the specific situation and through which ends themselves are expanded and clarified. Mead is explicit on the point that reflection aims to realize all the competing values; even when the exigencies of the situation make this impossible, the rejected value must still be recognized as a value that is to be taken account of when and where it is possible to do so. Mead is suggesting that the only standard of value is the expansion and harmonization of the impulses themselves and that, while values

will vary with interests and the employment of means, the only secure method for the maximization of value is to be found in the application to them of the scientific technique of reflection.

In the third place, Mead's theory of the self and his approach through the social act furnish a novel dimension to value theory. The values appropriate to the consummatory phase of the social act are, of course, social values, and the self as social, in so far as it is able to evoke in itself the complete social act—through its self-stimulation by language symbols—actually has the values of others as its values. Taking the role of others is as applicable to values as to any other phase of the act. Though Mead himself does not discuss the theory of value directly, his approach here has the same implications for axiology that it has for epistemology. How to get knowledge of what lay beyond one's self was historically paralleled by the problem of how the individual could be concerned with values other than his own. The answer is the same in both cases: as social the self is never confined to its own meanings or verifications; as social the self is never restricted to a set of values not shared with others. The axiologist has overgeneralized the sphere of the personal as the epistemologist has the sphere of the private and mental. While values, like givens and meanings and knowledge, have an individual aspect, there is common experience and common value to the degree that the act is social—and it must be remembered that for Mead the social act is the matrix of the individual act. It is Mead's merit to have presented an analysis capable of dealing, on an empirical foundation, with the social phases of value. In the same way that his theory of knowledge avoids both individualistic positivism and a transcendent metaphysics in its recognition of the social nature of universality and objectivity in knowledge, so his theory of value avoids the extremes of value anarchism and value absolutism through a companion insight into the social character of the universality of value.

Into the details of Mead's rather fragmentary analysis of the separate fields of value we will not go: the theory of aesthetic experience as the penetration of consummation into stages of

the act earlier than the actual consummation; the conception of the ethical as the phase of an act in which reflection is concerned with the maximizing of values in conflict within a social situation; and the elaboration of a functional democracy as the political and social ideal congruous with Mead's theory of the self have been discussed in the Introduction to *Mind, Self, and Society*.⁷²

One point not previously mentioned may be noted. Mead's version of empiricism has no place for any transcendently conceived metaphysics of religion, but it does have a place for the social psychology of religion and for certain of the values which religion has expressed.⁷³ It is unfortunate that Mead did not explicitly develop the potentialities inherent in the concept of the generalized other for an explanation of the concept of God. It would seem as if God might be regarded in this point of view as the generalized other taken as an object of devotion. The generalized other—as the generalization of any other participant in a common activity—has the necessary personal-impersonal character of God, while the dependence of the individual upon others in his activity would allow for the value characteristic involved in becoming an object of devotion. The form which the individual's relation to God would take would vary with many personal and historical factors and could well range from the concreteness of the father-image developed within the family to the impersonality and abstractness of many mystic experiences. Whether Mead would subscribe to this interpretation must, of course, remain in doubt; it cannot be doubted that his views have wide implications for the interpretation of religion.

In his historical interpretations Mead was generous in the

⁷² See also the fourth Supplementary Essay to that volume, "Fragments on Ethics." Dewey's extensive treatment of the value domains is in close accord with Mead's general position. This has long been noticeable in ethics and social philosophy. Dewey's *Art as Experience* (New York, 1934) makes the same relation clear in the case of aesthetics.

⁷³ Cf. T. V. Smith, "The Religious Bearings of a Secular Mind: George Herbert Mead," *Journal of Religion*, XII (1932), 200-213.

place he ascribed to religion in preparing the conception of the brotherhood of man through its generalization of the pattern of family relations, and even in the help it afforded early science by permitting an overly simplified picture of the external world—the soul, he once said whimsically, was the contribution of Christianity to science. He was sympathetic, too, with the religious demand for at-homeness in the universe, but he interpreted this demand in his own way: it is because man is social that he constantly sees before him the vision of an implicated finer society, in comparison with which his present is unsatisfying and his status somewhat that of an alien in a foreign land. Under stress religion might only worship the ideal from afar, but it did help to keep the ideal alive. It is to science and the attitudes which science engenders that Mead looked for the continual transformation of an envisaged consummation into present actuality.

22. Mead's statement that "it is the technical function of philosophy to so state the universe that what we call our conscious life can be recognized as a phase of its creative advance"⁷⁴ expresses a conception which all pragmatists have shared and which perhaps signalizes the central motive of the pragmatic philosophy. The accomplishment of this function within an empirical framework has involved a reformulation of empiricism, a development of a theory of mind and of knowledge, an analysis of the mechanistic world presented by science, and a clarification of the relation of reflection to the problems of value. This is not the place to point out and assess the contributions of various pragmatists to these common problems or to compare their contributions with those of Mead.⁷⁵ But a glance at Mead's own proposed answers in terms of his general theory of the act will throw into perspective Mead's thought in its largest outlines.

What is most distinctive in Mead is the depth of detailed

⁷⁴ This volume, Essay XXVIII, p. 515

⁷⁵ Something of this is done in an article by C. W. Morris, entitled *Pierce, Mead, and Pragmatism*, in the March, 1938, *Philosophical Review*

analysis which he brings to these common pragmatic theses and problems. He shares with other pragmatists the attempt to overcome the subjectivistic, sensationalistic, nominalistic, retrospective, and mechanistic extremes of the traditional empiricism. His own specific contribution is the analysis of the category of the social both in the reflective organization of the acts of individuals and in the organization of the perspectives which constitute nature. He is able to find the role of the individual and the differentia of the subjective within the perspective without making the perspective itself subjective or the individual an isolated individual. Between perspectives and within the perspective the social element in reflection allows the isolation of that which relative to the act is invariant, and permits the development of a functional theory of universals which makes universals objective without making them transcendent entities. It permits of the reinterpretation of the concepts of causality, continuity, substance, identity, object, and reality in a way not open to the traditional empiricisms. It avoids the simplification of those forms of positivism which equate existence and sense data.

Mead's social-symbolic theory of mind is certainly the most elaborated of all pragmatic theories of mind and is perhaps his most distinctive contribution. By regarding mind as the symbolic phase of conduct made possible by social participation, and by placing mind within the emergent process of nature, Mead makes provision within a naturalistic cosmology for the actual determination by mind of certain eventuations of natural processes. Final causes are thus reintroduced, but not in a wholesale and nonempirical fashion. Through the symbolic indication of possible futures—a process whose conditions are traced in detail—natural terminations become ends-in-view, and the world gains new directions and new contents which without reflection it would not have had.

The function of science is to give the conditions under which indicated and desired futures may be actualized. To perform this function, science extends the manipulatory area of the act

and gains the conception of the world at an instant whose contents are stated in mechanical terms. It is in this process within the social act that the distinctive scientific concepts are gained. But since the world at an instant is never realized, and since all scientific theories must be brought to test within the perceptual sphere of immediate experience,⁷⁶ the world which science presents is disclosed as the intersubjective world common to various perspectives and the condition for the completion of various acts. Science is brought within an expanded empiricism in which all the qualities which appear at all stages of activity retain their objective nature relative to and appropriate to that particular stage of the act. The interrelation of the developing act and the conditions necessary for its development tend to harmonize the biological and the empirical poles of pragmatism. The recognition of the instrumental character of the scientific world resolves the conflict between the mechanical and the teleological.

On Mead's approach reflection in general is regarded as instrumental to the attainment of the value or consummatory phases of individual and social acts. Nor are ends themselves viewed as static and fixed: "It is through the use of the means that we advance to the redefinition of the end."⁷⁷ The way is thus prepared for elaborating the significance of reflection as the means by which man may consciously enter upon the great and hazardous undertaking of taking into his own hands the direction of his own social destiny.

The detailed delineation of the interrelation of the domains of perceptual experience, science, and value within an empirical-pragmatic-naturalistic cosmology is the distinctive characteristic of *The Philosophy of the Act*.

THE EDITORS

⁷⁶ Cf P W Bridgman, *The Nature of Physical Theory* (Princeton, 1936), p 122: "Our meanings are thus ultimately to be sought in the realm of classical experience"

⁷⁷ This volume, p 474

BIOGRAPHICAL NOTES

GEORGE HERBERT MEAD was born at South Hadley, Massachusetts, February 27, 1863. His father, Hiram Mead, came of a long line of farmers and clergymen and was himself pastor of the local congregation. Through his mother, Elizabeth Storrs Billings, his inheritance drew from some of the most distinguished names in American intellectual and public life.

Few landmarks stand out from his childhood. When he was seven, his father was called to Oberlin, Ohio, to take the chair in homiletics at the newly founded theological seminary. Accounts of the boy agree that he was of an extraordinarily sweet disposition; there are the usual stories of childhood misadventures. The memory to which he himself recurred was that of his reading. Macauley, Buckley, and Motley opened the door to him for the magnificent drama of conflicting social forces. The fascination which social relationships held for him probably dated from this time. He never spoke of being enthralled by other tales, and in all probability fiction of a lighter sort was unwelcome in the Puritan atmosphere of the home on Elm Street.

With his older sister, Alice, and his mother and her twin sister, he went to the Philadelphia Centennial in 1876 and at this time was sent somewhere alone by way of Boston. He took the opportunity to visit a friend for two or three days, letting no one know of his whereabouts and causing considerable anxiety. At some time before he entered college he spent a summer on a farm, where he worked very hard and from all accounts was very miserable. How green he was to country life may be judged from the tale which he rather enjoyed telling of the instructions he received for dealing with the stud bull which was kept in its own paddock. Should the animal pursue him,

he was told to get on one knee and seize it firmly between the nostrils with the thumb and forefinger. He said afterward that he implicitly believed in the efficacy of the formula.

He entered Oberlin College in 1879. At this time the course was limited in scope, leading only to the A.B. degree, and consisted chiefly of the classics, rhetoric and literature, moral philosophy, mathematics, and a smattering of elementary science - chemistry and botany. Questioning was discouraged, ultimate values being determined by men learned in the dogmas and passed on to the moral philosophers for dissemination. The college life was serious; students had various literary societies designated by Greek initials, with weekly meetings and debates. There were also general student meetings at stated intervals for literary exercises leading to prizes and, I believe, to vigorous political activities.

It was here that he met Helen and Henry Castle, the two youngest children of Samuel N. Castle, who had gone to Honolulu more than forty years previously as financial adviser of the Hawaiian Protestant Mission. They had recently returned from a trip to Europe and no doubt opened to him a vista of travel and romance hitherto unapprehended. He and Henry became very intimate, for intellectually they were congenial. Argumentation occupied the bulk of their intercourse, and often they parted late, Henry leaning out of the window to shout a last point, while George would pause on a distant street corner to recapitulate or otherwise strengthen his position.

The classical portion of this curriculum, or perhaps more inclusively the literary phase, formed a deep groundwork. His later knowledge of poetry and literature was phenomenal; he also kept up his technique in the classics for much of his technical work and read in the original Greek and Latin to a very late period.

In 1881 Hiram Mead died. The sale of the house left the family with relatively little, and they moved to rooms in College Place. George waited on the table at the college halls for his board, and his mother taught at the college. The following year

his sister Alice married Albert Temple Swing and went with him to his pastorate at Fremont, Nebraska.

It was during this period that he and Henry Castle succeeded in refuting the dogma of the church to their own satisfaction. Its importance to them is best estimated from the fact that there is reference to this in Henry Castle's letters, as well as in George Mead's own statement. Products though they both were of many generations of Puritan theology, they likewise inherited that intellectual stamina and responsibility which had driven their forefathers to a new country in the first place, and later into the hazards of the foreign missions. The course at Oberlin provided scant fare for their robust intellects, and the mental revolution probably represented a clearing of the scrub forest which opened the way to a wider and more plentiful hunting-ground. Certain it is that their thought was no longer limited by theological considerations.

In 1883 George Mead graduated from Oberlin, and for the next half-year taught school. It was a school from which successive teachers had resigned, unable to cope with boys physically their superiors. He had a hard time, but succeeded in discharging the rowdy element one by one until he reached a minimum who were willing and anxious to learn. Just as he was settling down to his task, the board of trustees intervened with the statement that it was up to him to teach everyone, and so he followed his predecessors.

For the next three years he lived in the Northwest, alternately tutoring and surveying. In the latter activity he joined the survey of the Wisconsin Central (now the Soo Line) in laying out the first line from Minneapolis to Moose-Jaw, there to connect with the Canadian Pacific. The engineer in charge was drunk and apparently incompetent, for he was discharged and George Mead was given charge. He described the thrill he had when his party coming from Minneapolis met the other party at the time and place agreed, and found when he reached the United States Survey bench mark that he was less than three or four inches out in his computations.

He tutored during the winter months and read omnivorously. He seems to have been somewhat at sea mentally, if one is to believe the import of passages in his letters and those of Henry Castle's. At all events he entered Harvard in the autumn of 1887 and graduated with the class of 1888 the following June. His work at this time was chiefly with Royce and James; he tutored the James children during that year and the following summer.

During this year his cousin, then a little girl, told of him that he came on brief visits to Gloversville. While there he would tell her tales of a previous existence in which she figured as a princess or other great personage, and he arrived to rescue her from some impending calamity. His literary flair must have been great, for she said the tales never failed to enthral her, and she remembers them still as something more than half-believed.

It was at Harvard that he began to find himself, I take it, for the next year he went abroad to study philosophy and psychology, and from this time there does not appear to have been any doubt as to his course.

During the succeeding three years his intimacy with Helen and Henry Castle reached its climax. They were both abroad studying and traveling. At Leipzig the three stayed at the pension of Frau Steckner, and there Henry Castle fell in love with and married Frau Steckner's daughter, Frieda. He took his bride back to Cambridge, Massachusetts, where he studied law, and later back to Honolulu. George Mead saw a great deal of Helen Castle, the two moved in much the same circle. Both had a facility for making lasting friendships and for feeling out the worth of their friends, the names referred to at that time are those of still intimate relationships, of distinguished intellects.

He traveled throughout a great part of the world, was at home among people, whether old friends or strangers, and always knew of the internal situation of any land in which he might be. He was not a linguist, but, if he could not converse freely with the denizens, he read every newspaper within reach. Helen

Castle Mead has told me that if they two journeyed for a day through, say, France or Germany, she could tell all about the difficulties of most of her fellow-travelers on the train, he, on the other hand, would have some difficulty in placing individuals seen but could give a clear exposition of the political, social, and historical problems of the regions traversed; and he might for good measure discuss the aims and ambitions of the outstanding figures of the region

In 1889 Alice and Albert Swing came abroad for further study, at Halle chiefly. The following two years passed in study and travel. In 1891, during the summer came the news from Honolulu of Frieda Steckner Castle's death, thrown from her carriage by a runaway horse. Catastrophe brought the groups and the individuals more intimately together. Helen Castle was none too strong, and she as well as others have said that George Mead saved her life or reason at that time. On October 1, 1891, the two were married quietly in Berlin, Alice and Albert Swing their sole witnesses, and together they returned to Ann Arbor, Michigan, where George Mead had been appointed an instructor in the department of philosophy and psychology. A year later their only child was born, and the following year George Mead accompanied John Dewey to the same department at the newly founded University of Chicago, a connection unbroken to his death.

H. C. A. M.

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PART I
GENERAL ANALYSIS OF KNOWLEDGE
AND THE ACT

I

STAGES IN THE ACT: PRELIMINARY STATEMENT

A. THE STAGE OF IMPULSE

I SENSITIVITY AS A FUNCTION OF RESPONSE

ALL perception involves an immediate sensuous stimulation and an attitude toward this stimulation, which is that of the reaction of the individual to the stimulation. This reaction, in so far as the perception does not go out into instantaneous overt activity, appears in consciousness only as an attitude, but as such it is the first stage in the complete response or group of responses which the stimulation in question calls out. Furthermore, there accompanies this attitude of the response some imagery which is taken from past experiences in which the responses have been carried out, leading to the final experiences to which such a stimulation naturally leads. That is, a perception as such involves not only an attitude of response to the stimulation but also the imagery of the result of the response. A perception has in it, therefore, all the elements of an act—the stimulation, the response represented by the attitude, and the ultimate experience which follows upon the reaction, represented by the imagery arising out of past reactions.

Perception, however, must not be regarded simply from the standpoint of presentation, the presence of material. It is, even taken by itself and ignoring its relation toward later movement, a process of sensing under the conditions noted above, i.e., the conscious attitude of response, and the imagery of the result of the response. The process of sensing is itself an activity. In the case of vision this is most evidently the case. Here the movement of the eyes, the focusing of the lens, and the adjustment of the lines of vision of the two eyes require a complicated ac-

tivity which is further complicated by the movements of the eyes which will bring the rays of light coming from all parts of the object upon the center of clearest vision. The process of perceiving an object through the eyes (and this may be called the normal perception, since our perception through other organs of sense is so largely mediated through the imagery of vision itself) is thus an activity of considerable proportions. The perception by the hand is also one that involves such movement in the exploratory processes of hand and fingers and the movements of the skin. Hearing involves at least the fixing of the head (and the whole body as the basis for the movement of the head) and the innervation of the minute muscles which stretch the eardrum. Smelling involves the drawing of the air over the olfactory surfaces by means of the processes of inspiration plus the placing of the head in such a position as to make the smelling most effective. Tasting, in so far as it is to be distinguished from tactual perception, involves the bringing of the fluids of the mouth in continually changing contact with the taste buds through the processes of mastication. In normal perception, however, all the processes of hearing, smelling, tasting, and temperature-feeling are referred to some presentation of vision as that which is the source of the stimulations of the other senses. In the case of those congenitally blind or who have lost the imagery of vision, the imagery to which the sounds, odors, tastes, feels of temperature and touch are referred is that of the auditory, tactual, and in some degree, the temperature senses, which reveal the presence of an object at a distance. The sensing of the object as so located that the organism takes a definite attitude toward it, involving possible movement toward or away from the object, is thus a part of the process of perception.

Furthermore, the adjustment of the organism to the stimulation, as well as the movement of the body and its sense organs so that the process of stimulation may continue to the best advantage, involves an analysis of the stimulation. Back of each new content of stimulation lies a different attitude of response, interpreting this phase of the stimulation, and about

these new attitudes gather the imagery of the past experiences which have accompanied such responses. The relation of these images to the analytical processes of sensing is of peculiar interest. It is the field of selective attention, and what we note in the process is that under these circumstances we are not simply subject to new stimulations but there is present the attitude of looking or feeling or smelling or tasting, which as active picks out certain characters of the field of stimulation. The mechanism of this selection is frequently found in the anticipatory presentation of the object which is of importance. These images are not by any means always consciously present. They are most evident when we are definitely looking for an object, when we are hearing a tone out of a clang, or detecting an odor which we are able in some degree to hold definitely in consciousness.

Between such consciously recognizable images and the attitude of hunger in which the system is predisposed by physiological conditions to be sensitive to certain stimulations there may be many degrees. In common perception this is most readily identified as a consciousness of familiarity with the characters which our process of sensing brings out. On the one hand, this familiarity may seem quite passive and merely to register the fact that we are ready to react to these features of the stimulation; on the other, the process becomes active when we are in that state which we are accustomed to call "curiosity." The characteristic of curiosity is found not simply in the restless process of sensing but in an excitation of the responses of the system to the stimulations received. The hunger for novelty is never a mere readiness to receive new stimulation or a search for that which is merely new. Novelty is always a fashion, a fad of some sort, with a very definite selection implied. The most striking illustration of this is found in the comparatively narrow fields within which the sensationalism of newspapers will run. Nothing is more striking to one who assumes that we are curious in regard to mere novelty than the very meager list of subjects which an experienced newspaperman recognizes as carrying with them the quality of news. We complain not of the richness

of material which our sensational papers present but of the wearisome reiteration of the murders, scandals, and war scares which a popular taste seems to demand. Fresh stimulations of a slightly different nature from those to which the public is accustomed are demanded, but the field within which these stimulations may be sought is distressingly circumscribed. The explanation of this is to be found in a physical condition in which certain types of responses are stimulated, and through their stimulation render the reader peculiarly susceptible to the stimulation which will call out the response. While the detailed content of this stimulation soon loses its power of answering to this attitude of readiness to respond, the type of response remains the same, and the individual craves a new form of stimulation for the same sort of response. The psychology of ennui and of satiation, so far as it is wearying, is found in the irritability of certain types of response and the wearing-out of the particular stimulations which have aroused them. What is sought under these conditions are novelties in the form of the stimulation, not in the whole activity.

2 THE PROBLEMATIC SITUATION

The situation out of which the difficulty, the problem, springs is a lack of adjustment between the individual and his world. The response does not answer to the demands which gave the stimulus its power over the organism. The object was there for the individual, but it has ceased to be the object that it was. The contents that were there as object, in so far as they fail to answer to the response, are referred to the individual — not the original individual, for the original individual has no part in the object, it is simply there for him. And yet the object is different for each individual, owing to his perspective and his possibility of response to the object. There are certain values selected out of the object not only by the sensuous avenues of approach but also by his past experience of the object. Even for the perceiving individual in immediate experience there is an object which represents him as distinguished from other

individuals and as distinguished from the same individual under other conditions. Any object is thus always an expression of a peculiar relation between itself and the individual, but it is an objective relation. The character of the individual selects out of the object as it exists what answers to the nature of the individual in his present attitude—a selection which answers both to his immediate sensitivities and to his experience. The material which failed to call out the appropriate response and that which was found in the object as that which would have answered to the response which has been inhibited—these remain and, with the appearance of a self, are referred to that self.

That is, the characteristic of what is referred to the self, what is in the mind, is that it is not a thing, though it had the character of a thing. It has failed to call out the response which gives the stamp of reality to experiences. It could, and in the experience of the lower animals it presumably does, disappear, while readjustments take place in a trial-and-error fashion.

That it does not disappear in the conduct of the human animal is sufficient evidence that its retention in experience serves a purpose, or at least does some good. Its new function is indicated in the attitude assumed toward it as contrasted with that which is assumed toward things. The attitude which we, and all forms called intelligent, take toward things is that of overt or delayed response. The attitude which we take toward the contents of mind in their relation to the world is that of explanation. From the standpoint of future conduct explanation is such a reconstruction of the object, toward which conduct has failed to elicit the proper response, that this defeat may be avoided in the future. That is, explanation is substituting another object, with which we will be *en rapport*, for that which confessed its unreality in the experimental test of conduct. The goal of this reconstruction is that of bringing out the other aspects of the object beside that which has led to defeat, and so co-ordinating them that the inhibition, which was the evidence of defeat, may cease and conduct may go on. The method is that of referring the invalidated aspects of the object to the individual

in the form of the self. This can take place only when the individual has become an object to himself through the use of those gestures which can affect himself as they affect others, and only in so far as the individual acts toward himself as another, that is, takes the role of another toward himself. There is here the implication that, in the experience of the object by the individual, what is not object must be individual. It is the appearance of the self that makes it possible to carry out this implication, e.g., he indicates to himself his seeing an object at a certain distance with the object actually at another distance. In this fashion the false character of the object gets a local habitation and a name as the experience of the individual, and the true characters as tested by successful conduct are placed under this reflective attitude as in the same category; while the task of reorganizing the object so that the individual with both tendencies (those to react unsuccessfully and successfully) may continue to act becomes that of so envisaging the object that conduct may go on. This attitude carries with it the implication that what was unreal may become real through reconstruction. As unreal, it is mere experience of the individual; as real, it becomes part of the object.

B. THE STAGE OF PERCEPTION

1 PERCEPTION

Perception is a relation between a highly developed physiological organism and an object, or an environment in which selection emphasizes certain elements. This relation involves a duration and a process. The process is that of action through media which affect the sense organs of the biologic individual. The process takes time, and the effect produced upon the organism is later than the disturbance of the medium and still later than the influence of the object upon the medium. The customary interpretation of this statement identifies the perception with the effect within the organism, regarding these bodily effects as significant of the things that have mediately affected them, justifying this significance by the fact that any object or

event such as an organism is significant of the rest of nature and therefore of the particular objects which are involved in the process of perception, the selection of this particular object being due to the sensitiveness of the organism to the relation, one relatum of which is found in the nervous excitement within the organism.

This overcondensed statement implies a nature which is in so far given that the objects which arouse the activity in the media, the sense organs, the central nervous system, and the motor apparatus of response are all within the field of experience. They are all the preconditions for the analysis of perception into these parts. The chair that is perceived is not there before the influence exerted on the medium, or before the waves in that medium. They are all simultaneously there, and this simultaneous presence is essential to the explanation which relates the succeeding stages of the perception. Even the objects which lie beyond the range of immediate experience are brought within that field by an extension of the field so that they are regarded as simultaneously there as a basis for the explanation of our knowledge of them. What is involved in the explanation is the bringing into relation of objects which are all there. Even when that to be explained is a process, the objects which are related in the process are there for the observation that explains them. That is, perceptual objects are assumed as given for the explanation of perception. It is evident, then, that the explanation that is given is not of the perceptual objects which are used in the explanation of perception. Rather, given a world of perceptual objects, we are determining what are the particular conditions under which a certain perception takes place. It is true that any of the perceptual objects which are parts of this perceptual world might be subject to a like explanation, or, rather, we might state the conditions under which any perceptual object may appear, but in making such a statement we must presuppose a perceptual world within which this explanation takes place. What this amounts to is that the so-called explanation, or statement of conditions of the perception,

is not the perception itself, nor can the statement of the conditions of perception take the place of the perceptual objects. The analysis with its statement abstracts from the particular perception and leaves us, therefore, without this particular object of perception. It is, however, in terms of other perceptual objects.

The further implication of this statement is that the explanation, or statement of the conditions of perception, is in reality a statement of the method of discovering what the actual object of perception is. It cannot be a theory of perception, since we must assume objects of perception in order that we may state the theory; nor can it be an explanation of the perception of a particular object, for any explanation of a particular act would be also an explanation of any and all acts of perception. What we do actually in making such a statement of the conditions of perception of a particular object is to enable ourselves to identify a specific object and determine what the nature of the perceived object is. For this purpose we abstract from characters which inhere in particular objects and their situations and fasten our attention upon what is uniform in all objects and in all processes of perception. This enables us to identify the object of perception in its relation to the whole field and to account for the illusions of sense perception, such as reflected and refracted objects.

2 THE SENSUOUS CHARACTERS OF THINGS

The unsophisticated person finds nothing contradictory in regarding red as a character of an object for the normal eye and some shade of yellow as the character of the same object to the color-blind eye. In each case the color is assumed to be a character of the object, though there seems to be here an ascription of two different qualities to the same object—and qualities which exclude each other. In explaining the seeming contradiction, the individual would refer to the difference in the vision of the two eyes, thus implying that the quality in question involves the structure of the object, the passage of light waves, and the

reaction of the organism. This explanation does not make of the quality a relation. It assumes simply that the field within which the quality arises is not simply that of the structure of the object but is sufficiently enlarged so that it includes the medium and the affected organism. This does not define the quality as a relation any more than does the recognition that there are in the structure of the object parts related to one another as the conditions for the existence of the color. The identity of the object with these differing characters refers to certain identical characters, especially those of spatial and temporal position and those of contact experience. The goal of such an identification of the object as the same in the experience of both the normal and the abnormal individual will be a statement of the grounds for the color differences in terms of characters which are identical. The same theory that describes normal vision must describe abnormal vision, but such a theory does not take either the yellow or the red color off from the object any more than the interposition of colored glasses between the object and the eye deprives the object of the color.

The question whether a certain object has a certain color or not (or any other character) arises only when the conduct which the characters of the object call out does or does not reach a successful conclusion. Up to this moment the object as it exists in the complex situation including object, medium, and organism is simply there, and is what it is. If the colors and sharpness of outline lead to a twenty minutes' excursion to a mountain that is ten miles distant, we consider the perception deceptive without questioning the fact that in the complex situation of object and organism such an object was there with its characters. If the inability to distinguish between the colors of two objects which are different to the vision of others leads the individual to recognize that his visual apparatus is different from that of others, he does not question that in his situation the object was there with the particular shade which he recognized. What is done in each of these instances is to take those characters which hold both for the immediate perception and for later conduct,

for his visual apparatus and that of others, and identify the object. If in such an identification the conditions for the different characters ascribed to the same object can be harmoniously stated, the whole situation is taken into account.

It is only when this question has arisen that knowledge as such appears as an element in the experience. Otherwise the individual's perspective is simply the reality that is there. Such a selection of characters which are identical for all experience, or nearly so, and are identical for all individuals gives us the scientific object. They constitute an object of knowledge. The immediate perception is simply there and not an object of awareness or knowledge except as some question as to conduct or agreement with the perceptions of others arises to lead us to reflect upon it. It should be noted further that the whole method and apparatus of scientific analysis and experiment imply an unquestioned world of perception surrounding and validating the results of scientific procedure.

3 THE REALITY OF THE OBJECT IN PERCEPTION

The object in perception is a distant object. It invites us to action with reference to it, and that action leads to results which generally accomplish the act as a biological undertaking. This does not necessarily imply past experience. In the case of young infants and certain lower animal forms, notably insects, actions which perception invites may lead to successful conclusions which cannot have been experienced.

It will be objected that these perceptions, notably perceptions of touch, are not distant objects. The reply to this objection is that the object perceived through contact experience is such only in so far as it possesses an outline and position with reference to the whole environment which give it the character of a distant object. The distance perception is not necessarily that of vision or sound. It may be even that of tactile experience and the bodily experiences that go with this. For example, in a dark room one may with an outstretched arm locate the article of furniture which one wishes to avoid in moving through

the apartment. The tactile response to currents of air and changes in temperature may reveal the distant object. In any case, however, the object in perception is an integral part of the environment. Perception focuses this whole in the object. Thus the tactile experience of a distant object provokes an action which gets its implied value in an ultimate contact experience. It may be that the seeming experience sought is not a contact experience. It may be that the seeming satisfaction of the suggested act is found in the sight of a face or the sound of a voice. Yet these perceptual experiences still have a reality behind them that, if pushed to the limit, would demand action that culminated in some contact experience. The "what a perceptual thing is" is found in the contact experience alone, but it is a contact experience which is the last term in an act which originates with an experience of something distant, though this distant experience may be found in the action of any sense, even that of touch.

There is a further objection that may be advanced against this statement. It is that many of the experiences in a perceptual environment are not of things in the sense here indicated. A sound may be heard, an odor sensed, or a temperature felt which is not located. We seem to have no definite location in perception toward which possible action is directed. Whitehead has referred to these contents as sense awarenesses rather than perceptions. I find in these experiences only indefiniteness of location, not an absence of it. They still belong to the perceptual environment and still imply possible location and identification with a something that could, if the conduct suggested by the experience were fully carried out, bring us into contact with something to be realized in contact experience, though this something were only the definite air waves or chemical substances floating in the atmosphere. The difference is only one of degree in definiteness of location and subtlety of the thing perceived.

There are two different attitudes which we assume toward these perceptual objects as parts of an organized environment.

In the attitude of immediate experience the object as seen and then as felt is simply there. In this experience the individual may see and feel portions of his own organism, and these are simply parts of the whole perceptual field. In this immediate experience the distance characters of the object are not translated into contact terms. It is true that the reality of the seen object will be tested if need be by the completion of the acts which distance perception invites; but when the object is actually in the hand, it does not thereby lose its color or odor or sound, nor are these characters translated into contact terms. If one grasps a dimly seen friend in the twilight to be sure he is there, his seen color and form do not disappear in the contact experience. Nor would he be tempted to ascribe what he had seen to some process going on within his nervous system. He realizes that the eyes must be open and the hand in actual contact if the experience is to take place, but this fact does not lead him to locate the experience in a consciousness situated in his head or elsewhere. The perceiving individual in the experience is simply at the center of the perceptual field, located perhaps at the cyclopean eye, or in the throat, or in the chest. The rest of the organism is part of the field which he may see or feel but is not the effective center of perception. The reality of the object is what is seen or heard and actually or possibly felt, but keeping all its characters in the perception.

The second attitude, that of reflective analysis, does resolve the whole field, including the organism, into physical elements which could conceivably be the objects in a hypothetical perception, that is, their characters of location, effective occupation of space, inertia, and motion are those characters which appear in actual contact experience as the ultimate reality of objects in perception. This analysis substitutes for the color, sound, odor, taste, temperature, and even the feel of the object, structures and motions which cannot be any of the characters which they undertake to account for. This is true even of the contact experience, though the physical elements into which this analysis resolves things are those of contact experience.

The actual contact experience, however, cannot be the characters of these physical elements, for their structure and motions are the preconditions for the experience itself. There are in these propositions two different implications which need to be carefully distinguished. It is certainly true that what is the precondition of an experience cannot be the experience itself. Thus the hardness of a stone may be said to be the precondition of John Smith's experiencing that hardness. The hardness that John Smith experiences is in some measure different from that which is experienced by James Brown. In this sense the color of the book as it exists before it comes to the eyes of John Smith, or before the eyes of anyone, is a precondition of its being experienced. In this sense it may well be that matter as effectively occupying space, its resistance, its inertia, its mobility, as we experience these characters, belong to matter in finer divisions than those which we actually do or could experience, and these particles could still be the preconditions of the existence of the physical bodies which we do experience and also the preconditions of our own organisms which are necessarily involved in this experience. We could not experience the characters of matter which are the preconditions of the actual experience which we have. In the first place, these particles of matter with their characters must have been there in advance of our experiencing them, even assuming an imaginable experience of these particles with these same characters, and, in the second place, the actual experience of these characters is in any particular case in some sense different from that which we could have in any other case. We could still ascribe to matter in its finer divisions, which enter into the structure of bodies which we experience and into the structure of our own bodies, the characters which we ascribe to matter in our actual experience of it. This is the assumption of the physicist when he thinks that he has attached an electron to an oil drop. He has added inertia, increased the volume of the whole, and the mobility of the whole includes that of the electron. The other implication, which does not apply to this case of the fundamental characters

of matter, is this: that distance experience of any sort is of a different sort from that of ultimate contact and that the ultimate reality of the distance experience is to be found in that of contact experience. The physical explanation of the so-called secondary characters of bodies in terms of the so-called primary characters is, then, but an elaboration of the test of the reality which we may apply to any thing seen at a distance, i.e., actually handling it. In the elaboration of the test we extend the statement in terms of contact experience to the body at a distance and to the media by which the relation of the body and the organism is effected, thus obtaining an exact scientific statement of the controllable conditions under which the distance experience arises.

The reality of the distance experience, or of the object as experienced at a distance, or of its characters as those of a body at a distance, does not disappear even in this reflective analysis. The test of the completion of the act does not remove the reality of the distance characters of the object.

C. THE STAGE OF MANIPULATION: PERCEPTUAL AND SCIENTIFIC OBJECTS

The perceptual object is primarily the organization of the immediate environment with reference to the organism. Perception here has no other significance than that of the sense apparatus in its adjustment to the environment, in its function in selection of the stimulation needed for the reaction of the organism through its relation to the central nervous system, and in its calling-out of the appropriate response. The "what" of the object is, then, the expression of the whole of which both environment and organism are essential parts. If the function of perception in its immediacy were that of knowledge, it would be necessary to add to this object as it exists for the organism a capacity for awareness located in the organism. There seem to be two reasons for the assumption of this awareness. One is found in the reflective process in which knowing the perceptual object becomes a definite part of conduct, and the other is found

in the identification of the organism with the social self. The process of identifying the object and correcting our attitudes in the presence of unsuccessful conduct through the use of significant symbols (social in origin) in inner conversation is itself only a form of conduct, and as conduct is as immediate as any other type. In its reference to the object which is being analyzed and reconstructed it is mediate, and in its imagery of past and future conduct it sets up a field of experience which is in sharp contrast with that of the surrounding world of perceptual objects. When we refer the perceptual world to the social self that functions in this reflective process, there has been postulated a consciousness which is the receptacle of the immediate perception. In making this assumption, we overlook the fact that reflection presupposes the immediate world as given and that the self arises within social conduct within this field. What has further confirmed thought in this assumption has been the appearance of the scientific object, which is not the object of immediate experience and yet has been regarded as the reality of that object. Thus the object of immediate perception has been placed in consciousness, as the experience of this social self, while the real object is placed outside experience, revealed only by thought.

The beginning of this separation of the object of immediate experience from the scientific object was found in the distinction between the primary and the secondary qualities. The primary qualities were those of extension, solidity, and motion; the secondary were those of color, sound, odor, taste, and temperature. The real object was that which existed and moved in space and time, occupying space to the exclusion of other things, while the other characters of the object were conceived as states of consciousness of the self or soul. There were two powerfully contributing considerations to this distinction. One was found in the fact that both the organism and the environment could be stated in terms of these primary qualities as a so-called fundamental matter. The second was the fact that it was possible to state the conditions in terms of matter and motion

under which the secondary qualities arose. It became possible to regard the secondary qualities as effects produced in consciousness by the action on the organism of matter in motion. This still left extended inert matter in motion both in and out of consciousness. Locke and, later, the Scottish school assumed that there was an immediate awareness of this, while the secondary qualities were given only in presentation. Berkeley's and Hume's analysis easily showed that there was no passage from consciousness to an object outside consciousness in the case of the primary qualities if this passage had been denied in the case of the secondary qualities; and the Mills formulated the doctrine that our knowledge was solely of states of consciousness and that a world outside these was purely an assumption. In the meantime scientific analysis had carried the structure of matter far beyond the range of any immediate experience, and the mathematical analysis of space and time had substituted a conceptual space and time for that of immediate experience. Thus the real world was conceived of as made up of elements which by definition could not be objects of immediate experience, while the action of these elements was supposed to be the causes of the conscious experience, immediate and mediate. The scientist still uncritically assumed that the space and time of his experimental science was that of ultimate reality and that the elements of matter were but minute portions of the extended things of immediate experience. Thus we have been left with what has been called a "bifurcated nature." Its reality was found in the motions of physical particles endowed with inertia and exhibiting varying forces in their motions. With whatever epistemological justification, this matter and its motions seemed to belong to immediate experience, or could be so conceived—at least all observation and experimentation went upon this assumption. But the color, sound, taste, odor, and temperature of this world was lodged in a consciousness. The most convincing justification for this division has been found in the statement of the scientific object. This object in its structure and in the effects which it produces on the or-

ganism directly, but chiefly through media, is conceived of as the cause of the secondary qualities. It could, therefore, not have these qualities themselves. Surfaces which reflect waves of ether cannot themselves be colored, since they are the pre-conditions of the experience of color. Extension and solidity may exist both in and out of consciousness; but color and sound, being caused by the action of extended things, cannot inhere in the things. This position is, of course, entirely uncritical. If physical objects must be thought of as the causes of color, sound, odor, etc., through their action directly or indirectly upon the nervous system, they must also be thought of as direct or indirect causes of the consciousness of extension, duration, and solidity in so far as these are characters of things; but physical theory seems itself to have already left immediate experience in its minute subdivisions of matter into molecules, atoms, and electrons, although for the imagination of the physicist these physical elements are nothing but smaller and smaller bits of the matter which he has under his hand. However, though these minute particles could not themselves be experienced and in their combinations are thought of as the causes of the sensations of extended, inert matter, pressure, and force, we can still think of these particles as not only smaller bits of the matter about us, but the characters of inertia, of pressure, and force can be also indefinitely subdivided in imagination without losing their characters of immediate experience.

Thus we can think of the electron even as a bit of matter pulling away from or toward electrically charged plates, just as we can feel a piece of iron pulling toward a powerful magnet. But we cannot think of the surface which absorbs certain light waves and reflects others as having the color which we say we are conscious of when the reflected ray has affected the retina and the central nervous system. Physical theory itself lifts the color, sound, and other secondary qualities off from the object, leaving in their place certain structures and motions which are the indirect causes of the sensations but are as structures and motions qualitatively different from the sensations themselves.

For current uncritical scientific imagination the physical particles have the same qualities which we call the primary qualities of sensation. They cannot even for an uncritical imagination have the characters which we call those of the secondary qualities because physical theory has substituted for the secondary qualities certain structures and motions which are the causes of the appearance of these sensations in consciousness. Physical theory may be said to be explaining secondary qualities in terms of the primary qualities.

An explanation of the secondary qualities in terms of the primary is compelled to present the distant object, seen or heard or smelled, in contact terms, for the ultimate three-dimensional physical thing exists for us as something that could be conceivably handled and broken up by a sort of crumbling process into smaller parts of the same material character. When we regard a colored object at a distance, its reality for physical explanation is found in the object as we could come into contact terms with it, but now at a distance sending out original or reflected waves through a medium to the organ of vision. This analysis breaks up the whole perceptual situation that includes the distant object, the medium, and the organism, and recognizes a temporal process with earlier stages that precede the completed process. In so far as these earlier stages are occupied with objects, they could not be colored, for the whole situation is not given. In the case of contact experience the whole situation is there whenever the experience is present. If we present a distant planet, its matter is presented as we would actually sense it if we could place our hands upon it. It is true that even in this case there is implied a process in the nervous system between the contact and the excitement of the central tract, but even here elements and motions are also presented in contact terms as molecules, atoms, or electrons. In the case of colors and sounds we present elements of contact experience which must be active before the experience of color or sound can arise, and these cannot be presented in terms of color or sound. Our explanation of color and sound, then, im-

plies objects as existing before the experience of color and sound can exist. This does imply, however, that as over against the whole mechanism of object, medium, and organism the object has not these characters as genuinely as contact objects have the characters of extension and solidity and motion.

It is important to recognize that, in our explanations in terms of physical science, the organism is a part of the physical world we are explaining. There is an uncritical tendency to identify the organism with a so-called "consciousness," to make it in some sense subjective as over against an objective world of things. There is a certain justification in speaking of the individual as perceiving the world and in identifying him with his organism. In this case we think of him as explaining his color experience in terms of the light waves reflected from an object through a medium to his retina and so exciting a central nervous system, all of which are stated in contact terms. The individual, however, who is making this explanation is not the organism in the abstract terms of physical science. At his end of the process of explanation, he is a social being in an unanalyzed perceptual world, only a small portion of which is brought within the range of his investigation. The full statement of the reality must replace what contents have been removed in the explanation and must replace them in the perceptual objects, not in a consciousness. The explanation states what a being with only contact experience would find if he could follow out the physical process from the object to the organism and its central nervous system; and also affirms that in the temporally extensive process of distance experience the earlier stages can only be presented in contact terms as the preconditions for the distance experience.

Does this analysis of physical science present us with a picture of the world as it exists in independence of perception? If color and sound express a situation involving the entire mechanism of object, medium, and peculiarly developed organism, can we say that extension, volume, motion, and inertia do not imply a situation in which are involved also objects and organisms of specially developed types? And that a world which is

conceived of as independent of such situations may not be of an entirely different character? The most that physical science seems to accomplish in this direction is to free our perceptions and analyses of them from the idiosyncrasies and perspectives of particular observers. It finds uniformities which hold for all observers and thinkers. It does not transcend the fundamental conditions of contact observation itself. Ultimate physical particles in science are still in terms of the occupation of space, mass, and inertia. Ultimate space is that of the space of the measuring rod, the rod that can be applied by the hand; and the ultimate fact of physical reality in experience is that of the effective occupation of space by the physical individual, both in the experience of resistance to what invades his place and in the advance to occupy other places, together with the sense of boundary which comes with the tactile surface experience. The distinction between the distance experience of things and the contact experience of things, then, remains even when we present the physical conditions of contact experience in physical and physiological doctrine. The distinction lies in the logical relation between what the distance experience promises and the completion of the act which is involved in perception. When we undertake to give the physical conditions of contact experience, we place the apparatus of contact experience at a distance, directly in investigation of the physical stimulus and the dissection of the organism, or indirectly through the use of instruments of magnification, which the imagination may carry on indefinitely.

The essential fact is that, in the analysis of perception in reflective attitudes, this analysis must be carried on by perception. There seem to be two conditions for this analysis of perceptual objects by further perception; one is that just indicated, that any object of ultimate contact experience, which is the result of carrying out the act involved in distance experience, may be presented as itself at a distance and hence is capable of revealing other and more refined contact experiences implied in this distance attitude; the other is that in perception

of the object we endow it with the reality of effective occupation of space which belongs to ourselves, thus giving the object an inside content which no surfaces revealed to the eye or the hand can give, and this placing of ourselves within other objects enables us to perceive other things, and notably ourselves, from the standpoint of the thing within which we have placed ourselves.

The analysis of perception does not, then, take us to a reality which lies outside an actual or possible perception. It does take us to contact experiences which may have any dimensions required. These imaginatively presented contact objects are freed from the peculiarities which different distance perceptions give them, both our own and those of others, and it gives to them the uniformities which all must recognize, since the contact experiences of different persons are identical in the superpositions of measurements and the effective occupation of space, and since we place ourselves in the places of other observers.

D. THE STAGE OF CONSUMMATION

In the perceptual world the distance experiences are primarily stimuli to which the individual responds by approaching or withdrawing from the stimulus. The dominant stimulation from a distance is that of vision, and the organized spatial world of perception is in that sense a visual world. As Berkeley pointed out, the visual experience is or becomes a sign of the experience which results from the approach which the visual stimulus calls out. The full completion of the act which the distance stimulus initiates is found in some such consummation as that of eating.

It is not the consummation of the act, however, which is the perceptual thing that the distance stimulus sets going. One eats things. In other words, there is an experience of contact with the object which constitutes its perceptual reality and which comes in between the beginning of the act and its consummation. To this experience is referred both the visual experience

and the consummatory. They both become characters or adjectives of the thing.

This contact experience is not the bare contact with the surface of the organism. This, as in the case of feeling for a thing or in contacts of currents of air, may be a distance experience which leads to the thing itself. The physical thing arises in manipulation. There is in manipulation the greater fineness of discrimination of the tactual surfaces of the hand, the three-dimensional experience which comes from grasping, and, of more critical importance, there is the instrumental nature of the manipulatory experience. This instrumental nature involves bringing the act to a temporary pause. It does not go through to its consummation at once. In the case of the ape, almost all of the manipulatory processes are simply steps in approach or withdrawal. There is no arrest of the ongoing act as initiated by the distance stimulus. In the human animal this preliminary termination of the act in the contact of the hand is or may be the starting-point of a more complex process in which a physical thing appears as a mediation of the entire act. The arrest affords the opportunity for competing tendencies to response to arise within the act. The critical importance of this stage is indicated in the fact that we come very early to experience the distant field by means of the attitudes of manipulatory contact.

We approach the distant stimulus with the manipulatory processes already excited. We are ready to grasp the hammer before we reach it, and the attitude of manipulatory response directs the approach. What we are going to do determines the line of approach and in some sense its manner. It is the later process already aroused in the central nervous system, controlling the earlier, which constitutes the teleological character of the act. Into this situation there enter the alternative manipulations that the distant stimulus arouses. For the time being they inhibit one another and so the act. Different stimuli compete for setting free the act. If a nail has to be driven in the absence of a hammer, the eye wanders from a stone to the heel of a boot or to an iron bar. Finally, one or the other assumes

control of the act which is thus directed by this distant stimulus rather than the other. The human animal thus sees physical things, i.e., the initiated manipulatory response in the distant stimulus that sets free the activity of the organism.

Such an aroused future act has always a hypothetical character. It is not until this initiated response is carried out that its reality is assured. The experimental method is imbedded in the simplest process of perception of a physical thing. In this sense the future is already in the act.

And the past is also in the act, for facility and familiarity are products of past reactions. The physical thing, then, as distinct from a stimulus, is a hypothetical, hence future, accomplishment of an initiated process, to be tested by the contact experience. If it sets free the initiated process, e.g., driving the nail, it is a hammer. The environment around an individual is a set of such hypotheses, in so far as it is made up of physical objects. The assurance arising from facility and familiarity constitutes them objects which are there, but it is after all a provisional assurance which may be shaken at any moment.

Every act, however, is moving on from its physical objects to some consummation. Within the field of consummation all the adjectives of value obtain immediately. There objects are possessed, are good, bad, and indifferent, beautiful or ugly, and lovable or noxious. In the physical things these characters are only mediately present.

Physical things are means, and means for ends which often have to be discovered. They have an existence which is indifferent, therefore, to ends, and constitute the field of mechanism. Their hypothetical character is to be distinguished from that of the attainment of the end. In scientific method they are the indication in distance experience of a contact experience which constitutes the ultimate reality of what is given in an observation or an experience—the reality, that is, of the physical thing, not of what it may imply; in other words, the reality of scientific data.

II

THE LIMITS OF THE PROBLEMATIC

IT HAS long been a subject of comment, both within and without philosophic circles, that epistemology, the problem of knowledge, has excited not the slightest interest among scientists, whose profession is that of discovering what has been unknown. If there is a problem of knowledge, the knower par excellence has not had it obtruded upon him among the other research problems with which he is occupied. Even the psychologist, within whose immediate domain lie the data and processes that are traditionally involved in that problem, has dismissed the problem from his field, in so far as he has naturalized himself among the experimental scientists.

There have indeed been experimental scientists who have recognized certain phases of the problem, notably those such as Helmholtz, whose investigations included the physical processes involved in sense perception. To Helmholtz the sign character of so-called sensations in perception was of distinct importance, and the interpretations which he placed on various of the physical and physiological situations which he was studying were implicated in his theory of perception as an interpretation of signs.

There have been studies of the nervous system which have been quite bound up with theories of the functions of the elements of the nervous system in the processes of a so-called consciousness, while current causal theories of thinking call upon neurology to present neural data which are involved in thought. While such presentations and hypotheses of science have their direct bearing upon the epistemological problem, if there is such a problem, no one would suppose that the actual research problem of the physicist, or physiologist, in the form

in which he was pursuing its solution, could itself possibly be the epistemological problem.

The kernel of the epistemological problem is found in the assumption that the immediate object of knowledge is in such a sense an effect produced in the percipient individual that he is after all unable to know the world that he guesses to produce these effects in him, but can know only the effects themselves. He can only pass by an unverifiable inference from what must be called his own experience to the world external to that experience, but which he assumes is the condition of the experience from which he is unable to escape.

There are those in the various philosophic camps who still find absorbing interest in the intricacies which the attempted unraveling of this problem discovers. There are those who, while they are too tender of entities to make use of the razor of Occam, do not hesitate to ply the sword of Alexander in cutting the Gordian knot. They say that knowledge, instead of being an experiencing of an effect produced in the experiencer by something outside the experience, is but a relation existing between a mind and an object. There is no problem so far as the awareness of immediate data is concerned. There is still the difficulty in getting over from these immediate data to scientific objects which, by definition, never can be given in this immediate awareness.

It is not to these intricacies that I would invite attention but to the fact already noted that neither as a problem of getting from an experienced effect to a world that is responsible for the effect, nor as a difficulty in relating our immediate perceptual world with an atomic and subatomic world that is not and cannot be immediately perceptual, does this epistemological problem exist for the scientist, whose business it is to discover the unknown.

There are various standpoints from which this fact may be regarded—this fact that to the experimental scientist, whose undertaking it is to know the unknown, the problem involved in assuming the object of knowledge to be an effect produced in

the knower does not exist. The logical incidence of this problem in experimental science would be found in the validity which the experiment is supposed to give to the scientists' hypothetical account of the unknown. The experiment seems to be a hand stretched out into the dark unknown cleverly grasping reality and bringing it into the sharp light of knowledge, but, according to the effect doctrine of knowledge, this is a lying metaphor: knowledge grasps nothing. It has no hands, not even a prehensile tail. It is just one blind experience after another matched by unverifiable guesses as to the causes of these experiences, if there be any causes.

To the experimental scientist knowledge is evidently no such thing. It is a connection of objects formerly unconnected, an analysis and reconstruction of things, all to the end of extending a viable trustworthy world at a point where its structure proved faulty. If his identification of knowledge with discovery is legitimate, it has no common part with a doctrine that extends it, or dreams of extending it, beyond the world to what can never appear within it. If we abandon the effect theory of knowledge, we may define knowledge as an ultimate relation between a mind and the elements of the world, so-called sensory data, relations, and universals. Or we may confine this relation, which connects the mind with something outside it, to essences which can more easily be thought of as inhabiting both minds and things, while sensory data are treated as if they were effects in experience.

It would be difficult to find entities in which the research scientist would be less interested than these essences, unless one were to turn back in the theory of knowledge to medieval scholasticism and take down from the shelves and dust off the forms and quiddities of the Schoolmen. For this is the suggestion that I am making—that there must be some point or points at which a theory of knowing that is both competent and germane to its period will be of technical interest to its scientists, i.e., to those whose business and profession it is so to analyze and criticize its objects that they may become the data

of knowledge, and to so organize these data that that which is unknown may become known. Nor will their interest be excited in a doctrine that knowledge is a simple unanalyzable relation of awareness existing between the object or datum and the mind. This is a doctrine that may have dialectical interest. It can hardly have practical interest to the scientist. Nor have the logics, deductive and inductive, furnished the experimental scientists with techniques for stating their problems, for fashioning their hypotheses, or for suggesting the experiments by which they could be tested. Whatever explanation is offered for it, all who are familiar with the history of modern science will admit that none of its discoveries has been made because of a technique which logical theory formulated and inculcated.

There are, however, two aspects of the nature with which experimental science is occupied—aspects which are assumed in its researches and essential to its results, and which it cannot itself establish. The one assumption is of the systematic and uniform character of natural processes. The other assumption is of the integral part which those individual experiences, within which appear the problems of science and their hypothetical solutions, occupy in nature.

The scientist does not formulate this first assumption in the immediate presence of his problem and the formation and testing of his hypothesis. His attitude may be said to involve the assumption of the uniformity and systematic character of the world, but it does not appear as a part of his apparatus. The world as uniform and systematic is simply there for analysis and experiment. But it is part of his attitude that he is ready, upon the appearance of any other problem, to question this structure of the accepted world at that point. So far as this attitude is essential to the recognition of the continually shifting character of his problems, it does involve the inexhaustibleness of the field of the knowledge process and its openness to discovery, that is, the essential relatedness of things. The world is simply there, over against the problematic area, within which analysis and discovery take place, but the invasion of this world by the

problematic area produces in him the attitude of readiness to look for this relatedness of things wherever the problem carries his investigation. But it must not be forgotten that, however wide a diameter the problematic area assumes, it is always surrounded by a universe that is simply there and therefore to be used for experimental testing of hypotheses. Scientific technique is not interested in establishing the rational character of the world as the precondition of its operation. It is interested solely in locating its problem within the world that is there and in bringing this world to bear upon its attempted solutions. This interest extends to the development of the problem, as its area enlarges and the data which have arisen from its earlier analysis are brought into relation with the data arising from the analysis consequent upon the problem's wider scope; but, however wide the scope, there is always a world there that passes magisterially upon its observations and its hypotheses. The scientist asks himself not whether the world will be rational and law-abiding but whether this observation will be confirmed and whether experiment will pronounce in favor of this hypothesis.

This locates the whole field of probability within that of the problem, as the area of the problem, by the processes of so-called abstraction and generalization, widens until the solution fits into and becomes a part of an entire system of attitudes or responses toward nature. What happens, happens and, under one of its senses, may be characterized by the ambiguous term "necessary," but whether it is probable that in certain cities there will be next year in the months of November and February influenza epidemics is a question simply of the degree to which the therapeutic treatment of influenza during successive years fits into and becomes a part of the general therapeutic theory and practice over against infectious diseases. If this has become an essential part of the medical attitude, we say that it is in the highest degree probable that such recurrences of the infection will take place. In all cases of mere probability there are conflicting tendencies to respond to a certain part of a situa-

tion, and the degree to which one of these alternative responses fits into the organized response to the whole situation, which has been inhibited by this conflict, is the measure of its probability. Where the event justifies the guess, we are likely uncritically to speak of the event as in some sense constrained by the probability, while what has taken place is that we are confirmed in a certain type of organized response to a certain type of situation, and a certain type of object has arisen in our experience which was not certainly there before. The numerical expression of probability belongs to those situations in which the stimuli which call out the conflicting responses can be reduced to quantities in unit form, and thus the exact relative amount which will call out one response rather than another can be stated.

It is the fundamental distinction between the world that confirms observations and tests hypotheses, and the problematic areas of data of observation (their hypothetical elements of analysis together with the hypothetical reconstructions of thought) that I am emphasizing, together with the categories whose implications belong to the one but do not belong to the other. Thus, as I have just indicated, in the world of immediate experience events simply occur. In the problematic field of thought they are probable in varying degrees. In much the same fashion, in the world of immediate experience the world of things is there. Trees grow, day follows night, and death supervenes upon life. One may not say that relations here are external or even internal. They are not relations at all. They are lost in the indiscernibility of things and events, which are what they are. This world which is the test of all observation and all scientific hypothetical reconstruction has in itself no system that can be isolated as a structure of laws, or uniformities, though all laws and formulations of uniformities must be brought to its court for its *imprimatur*. The boundary of the problematic area divides this world from the field within which science is at work. However, as I have noted, this boundary, while definite for the test of observation and hypothesis, is by no means a permanent boundary, so that science occupies dual

attitudes toward it. For the purposes of its immediate investigation, it is there for proof and confirmation. But the very territory which is the seat of this authority may itself become problematic.

As possibly problematic the world is subject to analysis, is a conceivable structure of relations, of laws and uniformities. It can, however, appear as such only in so far as a nonproblematic world is there of which it is an area, and can serve as the touchstone of its reality. It is this that sets a limit to analysis; not a limit in the sense that a problem may not break out at any point in the universe but in the sense that a problem does not arise except over against that which is not problematic. It is especially important to recognize that in the operation of the experimental technique, that which serves as the ultimate touchstone of observation and working hypothesis is not of the nature of abstract law or postulate, either of physical nature or of so-called mind, or a subsistent world of universals. On the contrary the ultimate touchstone of reality is a piece of experience found in an unanalyzed world. The approach to the crucial experiment may be by a process of torturing analysis, in which things are physically and mentally torn to shreds, so that we seem to be viewing the dissected tissues of objects in ghostly dance before us, but the actual objects in the experimental experience are the common things of which we say that seeing is believing, and of whose reality we convince ourselves by handling. We extravagantly advertise the photograph of the path of an electron, but in fact we could never have given as much reality to the electrical particle as does now inhabit it, if the photograph had been of aught else than glistening water vapor. Thus we can never retreat behind immediate experience to analyzed elements that constitute the ultimate reality of all immediate experience, for whatever breath of reality these elements possess has been breathed into them by some unanalyzed experience.

It is true that these objects in experience have become different objects through this analysis and reconstruction, and

that, in so far as the structure of things is still merely that of working hypotheses, we seem to see and feel through their immediate surfaces the imagined elements into which reflective science has dissolved them. We thus reach the distinction between the world of our immediate conduct and that of the so-called data of science. For most intelligent people of the day it may be fairly said that the earth turning on its axis is a fact of immediate experience. The passage of the sun from its rising to the going-down thereof has become a revolution of the earth in the contrary direction. Yellow fever, instead of being an infection carried directly from the sick to the well, has become the life-process of a parasite that passes its period of existence in part in the mosquito and in part in its human host.

It has become common subject matter of popularizing science and philosophy, this almost bewildering passage of one world upon the heels of another in the last two or three centuries of the history of reflective thought. In the sharp and rhetorical contrast which is drawn between the old and the new, the emotive historian neglects that world of direct experience (which belongs neither to the old nor to the new) within which the scientific observations and experiments have taken place, while the phenomenalist has either impoverished it by its apparent abstractions in contrasting it with the old, or in contrasting it with the new, and, though recognizing its concrete nature, has condemned it epistemologically as particular and subjective.

There is only one way of locating this world of observation and experiment, and that is by its position within the field of conduct, reflective conduct, within which it appears. The problem inevitably appears in the experience of some individual, for it is the nature of that which is problematic to be, in so far as it is problematic, at variance with the world which is common to us all, and of that which in any way, however slight, has not its place in the public world, the individual who hears, sees, or feels it can only say that he has heard, seen, and felt it. A question, actual or implied, as to any happening carries it back at once to the experience of the individual who reports it, and its ac-

tuality is reduced to his experience. And the individual in any experience which is in any sense exceptional finds himself formulating what is exceptional as his own, while the setting and surroundings are there as the world of all. This is as true of thinking as of observation. The so-called commonly accepted truths appear in thought as there for all, over against which stand out the individual's objections, exceptions, and vaguer opposed feelings which are his own. Of course, the onward movement tends to take them out of this situation and give them universal validity. What I am insisting upon is that their actuality as experiences of the individual does not consist merely in the fact that he is the one that happens to be in their presence and so to see or hear or think them. It is the phase of the experience which is so peculiar that its reality has no other ground than that A. B. saw, heard, or thought it, which forces it upon the biography of the man. None of us assumes that the reality of the forest is dependent upon its being observed by those who pass through it, but for considerable periods such exact observations as Darwin's upon the fertilization of orchids rested for their reality in his having had those experiences. It should be repeated that such experiences exist, necessarily, only in the midst of the world of common reality.

If the common world within which the individual experiences are located disappeared, the individual experiences as such would disappear also. Not only would the basis of distinction between the two be lost but the individual would have no ground for recognizing them as his own. The self to which these experiences are referred is an object in this common world, and in particular the credibility of the scientist stands as guaranty of the actuality of the observation because the scientist belongs to the unquestioned world, along with his admitted characteristics of equipment, accuracy, and impartiality. The individual belongs to the common world, but the individual's experiences of what can have no place for the time being in that common world have a logical position that lies betwixt and between the old reality invalidated by the exceptional experience and the

new reality which is yet to arise and within which these experiences will not be exceptional, and will therefore not be beholden to the biographies of any observer for their local habitation and their name.

If we remain within the field and implications of scientific technique, it is palpably illegitimate to resolve all reality into such terms of individual experience, after the fashion of the phenomenalist or positivist, since the very definition and distinctive characters of the individual's experience are dependent upon its peculiar relation to a world which may not be stated in such terms, which is not analyzed but is simply there. This is most strikingly evidenced in the psychological laboratory, that externalization of so-called introspection, where we find the conditions under which may be rendered specific the experiences which are individual. The whole paraphernalia of experimental science stands there as the condition of the full exploitation of what is private. It is a mistake to emphasize the artificiality of this experimental apparatus and technique of the psychological laboratory. As in the case of the laboratories of the physical and biological sciences, the building of its apparatus and its technique is but rendering specific, exact, and hence formally universal, the instruments and behavior of untechnical conduct. They refer to and render definite a certain type of conduct and the objects in the experience, and the reference and definition are related to their function.

The logical locus of this field of experience has been indicated as that of objects and occurrences which have such opposing values for the individual that his responses are inhibited, or inhibit one another. Answering to this situation the objects that were there have disappeared. Such a situation in its simplest form would be found in the case of the dog offered meat by a stranger. The attack upon the stranger is inhibited by the movement toward the meat, while the hostile attitude toward the stranger checks the rush toward the food. There is present, then, neither an enemy to be attacked nor food to be seized. The dog is nonplussed. There are, of course, plenty of objects

present surrounding the center of interest, and in that center there will be for a time an object which maintains itself momentarily and is evidenced by a rush forward to attack; and now the other object will indicate its presence by the incipient movement toward the meat, but these actions are not completed. If a final compromise is effected and the dog advances growling with bristling back, seizes the meat, and rushes off, it is reached by what has been termed the trial-and-error method, and was represented by no transient objects which could exist in the dog's experience as both dangerous and attractive.

As in the psychological laboratory, then, the data of individual experience stand dated and causally related to the unanalyzed world, and yet endowed with an existence which is distinguished from the frame within which they are set. They can be identified only as the experiences of a specific A. B. or X. Y., or in the scientific journal as of John Smith or of James Brown, who must have a specific reality in order that these observations or experiments may be of importance.

Their first outstanding characteristic is that in some degree they have lost their realities as objects, otherwise no one would obtrude his personal reading of the events in the place of an unquestioned fact. Something in the events is sufficiently unusual, sufficiently checks his onward conduct, to justify the transfer of them from the landscape and environment of action to the mental or physical notebook of his biography. This must not be confused with an instantaneous appearance of another object in the place of the original object. In this case the data of individual experience do not appear at all, or, if they can be identified, they occupy so slight a place that they fail to maintain themselves in the record. Again later events, or an indirect criticism, may show that the object was not there, and we interpolate these individual data in a post mortem analysis of the events. It is wise, in this account of the actual procedure of reflective experience, to insist again that nothing in this procedure justifies the extension of this actual dissolution of ob-

jects into the data of individual experience to the surrounding field of objects within which these biographical data appear. If this is done after the fashion of the modern inheritors of Hume's analysis, all the import of the data disappears, and, by the same mark, the whole technique of experimental psychology is abandoned.

It is one of the instances of this transfer of analysis of the object into elements of individual experience over to the world of objects that supports the individual and is independent of him, that one should introduce Hume's skeptical thesis under the heading of the egocentric predicament. It is entirely true and accepted of all men that what may not be placed or found or allowed to exist in the great public world is in the predicament that its dismembered parts must appear in the experiences of individuals. It is the predicament of the object, but the glory of the individual, the foundation of his fame, and the theory of copyrights. On the other hand, the moment that the transfer is made of this predicament to the rest of the world, the very people who are most intensely interested in its application in the field of discovery, invention, and property rights in ideas are terribly bored by this wholesale addition to their territory and individual estates. It is a case in which a fraction of a loaf is worth infinitely more than the whole. It is a philosophical application of the doctrine presented in the rhetorical question, "What shall it profit a man if he gain the whole world and lose his own soul?" For to gain the whole world epistemologically is to lose the import and character of the experiences that constitute the self. In the problematic situation these shattered fragments of things are the building materials first of the mind and second of the repaired world, but they would have as little value without a world independent of them as would a million bricks and a carload of Portland cement at some unoccupied point in starry space.

Another standpoint from which to view this situation is found in the personal character of error, as well as of sin. The ambi-

guity of truth has been responsible for more metaphorical hand-washing than that of Pontius Pilate.

The same sort of ambiguity does not obtain with reference to error. An error must be somebody's error. If the term is used of what is not a self, the use is itself an error or is metaphorical. A belief whether true or false is an attitude of a self, but while the content of the true belief, its referent in the world, is there and an object independent of the self that believes in it, the error is a belief in that which is not there. It is objected that in fact the reference is to a context which excludes the object believed in. This takes care of the situation when the error has been recognized; it does not place the erroneously accepted object of the belief. The man that was seen is now placed as a swaying tree, but while this swaying tree is the object of reference of the attitude of the believer when he has identified it as such, and corrected his error, the actual content of the man seen is still to be located. As the content of an erroneous belief it is placed in the mind of the one who is in error. A particular philosophic creed may demand that there subsist an erroneous object to which this erroneous mental content refers. This demand, if it exists, arises entirely from a supersensitive logical conscience. The attitude of the scientist that is of interest here is quite satisfied with locating the mistaken content in the mind of the man at fault. He may point out the curious likeness of the tree at a distance to the human form and the verisimilitude of the movement of the branches to the bending of its body, but these still omit the man that was seen, however closely they approach him in their likenesses. As one recalls with surprise the memory of the event, the form of the man stands out sharp and clear, over against the deceptive foliage.

The logical structure of the erroneous content is not to be distinguished from that of the hypothesis. They are both located in the mind. In one case the structure has been intentionally raised, while in the other case the elements have fallen together, answering to the response of the human organism.

But the erroneous content is not in the mind until it is recognized or is on the way to being recognized as erroneous. I am here not referring to mind as a metaphysical habitat but as the locus of what are, in common parlance, termed "ideas," "imagery" in so far as it enters into the texture of memory, "reverie," "creative imagination," and "thought," and I am attempting to accomodate it to that untortured usage in which the objects of a vivid dream remain outside the mind until one undertakes to explain it. The sphere of the heavens was evidently not in the minds of those that saw it revolving in its diurnal course. But its crystalline fabric is placed there now as an erroneous picture of the structure of the physical universe.

However, science does not assume that it has secured an accurate picture of the universe into which every new discovery must fit if it is to be recognized as true. It is eagerly at work reconstructing itself not simply in details but as fundamentally as possible. The doctrines of science, its findings up to date, are essentially working hypotheses, which are not only subject to change but in which change is expected. On the other hand, every acceptable hypothesis which supersedes another must take up into itself not only the so-called facts which the earlier hypothesis accounted for, but it must also account for the superseded hypothesis itself and, as a discarded hypothesis, make it a part of its universe. The Copernican hypothesis was called upon not only to account more satisfactorily for the anomalies of the heavens than its predecessor but also to give its natural place to the Ptolemaic doctrine as an appropriate explanation for these same anomalies, by minds operating in their earlier experience. The world of science is an evolving world whose later forms arise out of the earlier and justify themselves not only by mediating successful conduct but also in justifying the earlier forms by their conquest of them. They have died, these earlier worlds, and have passed into the heaven of the mind as ideas. We can give no adequate evidence of a mistake except in showing how and why the mistake was made.

Thus as we look back the same world was there existing for a narrower experience, in a form which to wider experience possesses reality only for that narrower experience, from our standpoint only as idea. But the identity of the two worlds is found only in the common observations made by Hipparchus and Tycho Brahe. It is in the so-called facts of science, the observations in which all uniformities appear, that is found the bedrock upon which all hypothesis rests, and these facts are imbedded in actual or assumed experiences of individuals. In the passage from one doctrine to another, in the assimilation of the old to the new, we come back to a field of reality which can exist for the time being without incarnation in a public object, only because it can be stated in terms of what happened in the biographies of individuals.

It is true that observations require confirmation, but their confirmation is not a deduction from accepted impersonal premises but the appearance in the experience of another individual of the same observation. It is in the mouth of two witnesses at least that it must be confirmed. It was in the growing dependence of science upon this living identical material in changing theories that modern empiricism found its assurance and lost that skepticism that inevitably attached to empiricism in ancient thought.

These observations have two aspects. They are isolated not only by an abstractive attention but also from their natural responses by the inhibition that inaugurates the reflective attitude. As such they stand as experiences of individuals as above described. Their impersonal character is lost by the inhibition of the universal response—that which identifies them as objects for any and everyone in the same situation. A further analysis of this, of course, is necessary. I wish, for the time being, merely to call attention to this distinction which appears abstractly in the psychological analysis of conduct, the distinction between the values of the stimulus and the response, when through inhibition of the response the stimulus remains for the

time being without its functional import. In this situation experience in so far as it appears as stimulus, in other words as "sensation," especially as this is used by those who are following the Humean tradition, has its existence inevitably in the so-called consciousness of the individual, while the response belongs in the outside public world, which has been cut off by the inhibition. It can appear, then, only as sensation, the innervation of muscular responses that have been checked, have lost their full value. To deny this fulfilment, to identify the object with the sensations of muscular reactions and with the imaged experience drawn from the past, is to present its reality in what by this Humean tradition is termed "idea" or "sensation." This identification has its great importance in directing conduct, but it is only the source of ultimate skepticism if it substitutes for the reality in the world outside the organism to which the conduct leads, the experiences within that organism when that conduct has been inhibited. The logical importance of experimental psychology is found in the fact that it makes no such substitution but tests its findings of individual experience by a world which is not individual.

It is well to elaborate this somewhat further. Experimental psychology undertakes to give as exact an account as possible of the conditions under which sensations and ideas appear. The account is given in terms of the organism and the findings of the laboratory. These organic conditions, specifically those of the nervous system, and the apparatus and happenings of the laboratory, are, then, presuppositions of the sensations and ideas. They are there in advance of the sensations and ideas, and they will be there when these have passed. It is, then, quite impossible for the scientist, in this case the experimental psychologist, to translate these objects into sensations and ideas without at the same time implying organisms and the physical world of which the laboratory is but a part, as the conditions of the sensations and ideas into which he is translating these objects. It is not amiss to emphasize the fact that this world is a whole

and that it is inadmissible to give a privileged position to the organism or its central nervous system. It is only fair to the scientist to say that he has no inclination to so exempt the brain and its connections from the implications above indicated. But there are those sufficiently uncritical to speak of that which is going on in the brain as the condition of experiences which are only sensations, colors, sounds, feels, and odors or tastes, and then to affirm that the objects, whose characters these are, are in reality nothing but congeries of these sensations. There is perhaps a peculiar temptation to slip into this position anent the distance characters of things, especially those of vision. This is largely due to the physical theory of color, which resolves it into processes involving physical particles that, by the theory of color, could not themselves be colored, but whose matter can be thought of without contradiction as minute parts of the matter of contact experience. The extended character of an object crumbled in the hand is indefinitely divisible. Given an organism minute enough, and the smallest subdivision would be there in its experience as extended matter, but the length of a light wave sets the limit to what may be colored. And what is true of color is true more evidently of the other characters that belong to objects at a distance. It is then possible, in an uncritical moment, to island the organism as an extended palpable thing surrounded with sensations of colors, sounds, tastes, and odors that are but signs of palpable objects, and to locate these characters in the sense organs or the nervous system. This was indeed the position of Locke, with his theory of the primary and secondary qualities and his assumption that the extension of the primary sensations and of the outer world was identical.

But the experimental psychologist, who is examining the experiences of an individual qua individual, is conducting this examination in an impersonal world that is the presupposition of this individual. In this common world things are what they are where they are and must be such if by means of them the scientist is to isolate the anomalies of individual experiences. To a color-blind eye a certain shade of yellow is a sign of green,

but only in a world that has in it green objects. By a pardonable extension of this explanation of color-blindness, we may say that certain shadings are signs of the form which we will feel when we handle the object, and by the same mark a symbol conveyed by word of mouth, by radio, or in any one of a thousand different ways, could be a sign of the same form, as it appears in contact experience. No one of these latter signs, however, is by any possibility the object existing there at a distance, while that is exactly what the so-called visual experience is. Objects existing at various distances are something more than notifications that other objects will exist under other conditions. When we speak of perception as a reading of signs, after the manner of Helmholtz, there is considerable danger of confusing the undoubted significance of distance characters, in respect of contact characters, with the relation between an object and an individual, in what is called "perception." The analysis of these relations in reflection presupposes not only the objects existing in a world of like objects but also the continued existence of this world as the seat of its operations and the test of its results. It is in terms of colored disks and yarns that we justify our color theories. The man who corrects his perception of a mirror image of objects on the other side of the room must still inhabit a world of objects that are what they are where they are as a basis for his correction.

We can reject, then, the epistemological interpretation maintained at times by the positivist and the psychological philosopher that the experimental method carries with it the implication that the resolution of problematic areas into experiences of individuals allows us to regard the results of this analysis as the elements of all the reality with which science deals. On the contrary, such an analysis only takes place within a world that is not subject to it, and which in its unanalyzed state must serve to test the observations and hypotheses which formulate and undertake to solve the problems of science.

These, then, are the two points at which the scientific procedure of discovery, or knowing, raises questions which it does not

itself answer, but in the answer to which the scientist is bound to be himself interested:

What is the implication of experience which is at every point subject to the possible appearance of problems, the test of whose solutions is to be found in experience?

How can the incongruity of the incidental, not to say accidental, position of man and his mind in nature, and the fact that the problem always appears in an individual human experience and finds its solution there, be removed? What is the relation of human reflective intelligence to the world with which science is occupied?

III

THE NATURE OF SCIENTIFIC KNOWLEDGE

WE HAVE reached certain points in the implications of the method of experimental science which may be summarily restated. In the first place, the scientist's knowing is a search for the unknown, a discovery, but it is a search for what has disappeared in the conflicts of conduct, that is, for objects which will remove the antagonism—it is a search for the solution of a problem. This dissipates the Platonic puzzle of how we can seek to know what is unknown. It is interesting to note that Plato's solution of the puzzle is found in the form of ignorance as a problem, that of recollecting what has been forgotten. Unfortunately this theory could not apply to the discovery of new types of objects which were foreign to the world of past experience.

In the second place, experimental science implies a real world uninfected by the problem, which can be used to test the discoveries which science makes. If knowledge is discovery of the unknown, this world is not known—it is simply there.

In the third place, as the world that is there is not known and may not therefore as non-known have ascribed to it the sort of logical necessity that does obtain in the logical structure of hypotheses, experimental science finds nothing contradictory in the later appearance of a problem in any portion of the world which has been used to test the solution of a former problem. That a contradiction should appear in the hypothesis is proof of its faulty and, in that sense, unreal, character, but that the sun ceases to be an object revolving about the earth in no way invalidates the world by which we test the hypothesis of the revolution of the earth on its axis by the shifting of the path of the pendulum's swing. Logical necessity obtains in the field of

reflective thinking. To transfer it to the world that is there, and within which thought is occupied in the solution of problems, would be to dismiss experimental science as a meaningless and pernicious discipline and to return to the science of dogma.

In the fourth place, in observation and in experiment, science finds a field that belongs both to the world that is there and to the reflective thought of discovery, that is, of knowledge. The problem does not exist *in vacuo*. It is in the world that is there, but a certain portion of the world that is there has disappeared. The disease that is conveyed by contact disappears in the evidence of sporadic cases, notwithstanding its epidemic character. But the scourge is all the more tragically there. The instances of the disease are now observed and recorded by physicians and health officers who are seeking to discover the mechanism of the spread of the infection. These data embodied in various hypotheses exist in the minds of the investigators. As the observations of competent investigators of the actual epidemic, they are there as parts of the experiences of these individuals, and the records of them are parts of their biographies. The test case of the heroic scientist, who has remained immune to the fever after wearing the clothes of those who were sick of it and sleeping in their beds, and who succumbs to it when stung by the mosquito, begins in the field of scientific data and personal biographies and ends in the impersonal world to which belongs the two-chaptered history of the yellow-fever parasite. In so far as these data are imbedded in the lives of these individuals, they are personal but hard facts. So long as they are tentatively suggestive of objects that would harmonize conflicting ways of cataloguing and treating the disease, they are in the minds of men as part of the structure of their ideas.

We must distinguish here between what belongs to the experience of the individual qua individual and what is in his mind and may be termed "subjective." In the former sense the observation may be called private because the investigator alone observes it. Indeed it may be such an instance that he alone can observe it, if, for example, it is his own ache or pain, or if no one

else has seen it, and it is an instance that is not repeated. This circumstance does not abstract it from the world that is there, since these men are there in that world together with the events that take place in their lives. But, in so far as the experience suggests what is known of the relation of the mosquito to malaria and a possible parasitic organism that may be the cause of yellow fever, we are in the presence of an idea and of what we will call "subjective." Such an object is not as yet there and may never be there. It is an ideal object. Such objects, as before remarked, have the same locus as erroneous objects after the error has been detected and are not to be confused, because they are placed in individuals' minds, with individuals' experiences, which are peculiar to them, but are objects in the world that is there. I am not, of course, ignoring the problems involved in this distinction. I am for the time being merely insisting that experimental science never takes the position so common in philosophy, which confuses the two. To the experimental scientist the data of observation and experiment never lose the actuality of the unquestioned world because they can happen for the time being only in the lives of particular individuals, or because they are fitted to serve in the mental processes of discovery. They are solid realities that can bridge the gaps between discredited theories and the discoveries of science.

It is the position of the positivist that what is observed is, as a fact of experience, there in a sense in which it never can be false. He recognizes that there may be false inferences drawn from the observation or the experiment, but as a fact of immediate experience it simply is and therefore is not open to possible question. This assumption does not answer to the procedure of science, for whatever may be the theory of sensation, the scientist's observation always carries a content or character in what is observed that may conceivably be shown under other conditions to be erroneous, though the probability of this be very slight. In psychological terms, an observation is never a mere determination of a sensation (if there is any such thing in adult experience) but is a perception, and, whether all percep-

tions involve judgments or not, they are frequently illusory, as, for example, in the perceptions of mirrored objects, and can never be free from the possibility of analogous errors.

What gives to the observation or experiment its validity is its position in the world that is there, that is not questioned. It is indeed carefully isolated from what has fallen into question, and this meticulous cleansing from all implications of the abandoned doctrine, and all as yet hypothetical interpretations, creates the impression of an experience which may not be subjected to any further question; but, as we know, there is no part or portion of the world that may not conceivably be the field of a scientific problem.

In the so-called exact sciences we seem to approach an object which is nearly free from all possibility of contingency—the physical particles. These particles are approximations to that which is unextended in space and time, but they carry a character—that of mass or of electrical energy—which does not approach zero, however minute it may become, and it is a character which is reached from numberless observations and not a little speculative theory. Furthermore, the procedures in our laboratories and observatories by which these characters are reached involve perceptual objects of the most complex nature, subject under other conditions to all sorts of conceivable questions. In other words, while the methods of mathematical analysis and extensive abstraction constitute a body of doctrines which in themselves are necessary, as long as the terms carry the same references, their applications are dependent upon their functioning within the problematic situations which arise in research science and appeal for their validity in practice to the court of observation and experiment.

The scientist's attitude is that of a man in a going concern which requires at various points readjustments and reconstructions. The success of the readjustments and reconstructions is found in the triumph over the difficulty, as evidenced by the fact that the concern continues to operate. He finds his tests in the parts of the whole which still operate. This does not imply

that readjustments may not be called for later at these very points to which he now appeals for confirmation of the success of his solutions of the immediate problems before him. Surrounding the most profound analysis of the structure of matter, and the widest survey of the galaxies of the heavens, lies the field of things within which experiment and observation take place without question, and which gives its validity to cosmologies and electronic theories of matter. It may seem a misnomer to speak of the world within which lie the observation and experiment as surrounding such hypothetical constructions as the electrical theory of matter, or the galactic form of the universe, since these hypothetical constructions so far transcend, in the subatomic world or in the indefinite stretches of the heavens, all the world of objects which includes our observations and experiments. We seem rather to be islanded in a very minute region occupied by perceptual objects that are in their constitution vague, indeterminate, and incurably contingent, surrounded from within and from without by a universe, which science presents, that is occupied by objects that approximate exactness of definition and necessity in their forms and changes. And yet the scientist, when he times microscopic oil drops as they move toward or away from charged plates, or when he measures the distances of photographed stars from one another before and during an eclipse, has not at all the attitude of a man perched insecurely upon obscure and adventitious data. The world that is there has taken up into itself all the order, definition, and necessity of earlier scientific advance. It is not there as hypothesis, in so far as the hypotheses have justified themselves in experiment, nor is it there as analyzed relations, events, and particles. These characters have passed into things, and for the time being at any rate, they are there unanalyzed, with the same authority as that of the so-called sensible experience. It is only necessary to emphasize again the distinction of the data as parts of the mental process of anticipating hypothetical objects, and as imbedded in the world of unquestioned reality in the experience of the individuals to whom the problem has

come and who are trying to solve it, as well as in the impersonal world within which these individuals exist.

What renders such a statement of the world (not as known but as there) somewhat bizarre is that we enter the world of the scientist by the process of learning. In schools and institutions of higher learning we are taught the doctrines of modern science. Most of us take no part in the work of discovering what is there found out, but we acquire it by a process of learning, in which we may retrace some of the steps which research has followed, while in the main we accept it largely on faith in the men and their methods, especially faith in the checking-up of the results of certain individuals by all the others in the field. Scientific journalism as well as the daily press keeps us informed of the latest advances, and, having learned these facts, we say that we now know them. The world that stretches so far beyond our experience seems in this sense a world of knowledge.

It is true that all acquirement of information, in so far as it is more than a mere parrot-like facility in repeating what is read or heard, is a reflective process in which a problematic situation is met with discovery, though the hypotheses and their tests are those of others. Our own hypotheses and tests have to do largely with the competence of the sources upon which we draw. Admitting, however, all the criticism that the layman can bring to his education, this world of knowledge is evidently of quite a different character from the world that is there, the world that is seen and felt, whose reality is the touchstone of our discoveries and inventions, and very different from the discoveries and inventions themselves, which are the knowledge par excellence of research science.

It is in the acquirement of information that the copy theory finds its explanation. There, what is known must answer feature for feature to its prototype. This field of so-called knowledge is that of the assimilation of the experience of others to one's own experience. There may be involved in it the discovery of these other experiences by the individual, and it is in so far knowledge, but the content of that which is said to be learned

is not discovered in the sense in which the other has discovered it.

In its simplest form what takes place here is the indication to one individual by another of an object which is of moment in their co-operative activity. This gesture becomes symbolic when it arouses in the individuals the attitudes which reaction to the objects involves, together, generally, with some imagery of the result of that action. It becomes communication when the individual indicating the object takes also the attitude of the individual to whom he is indicating it plus that of his response, while the individual to whom the object is indicated takes the attitude of him who is indicating it. We call this taking of one another's attitudes consciousness of what we are doing and of what the other is doing, and we incorrectly apply the term "knowledge" to this. The mechanism and import of this social procedure will be discussed later. What I wish to point out at present is that this process in itself does not involve discovery, any more than does that of perception. When doubt and discrepancies arise in the process of communication, as they continually do arise, the necessity of establishing agreement between the symbols mutually used, and that which they symbolize and the results of the conduct they imply, calls for a one to one correspondence between the symbols and those things and characters symbolized in the experiences of the different individuals, and this gives rise to the theory of knowledge as an agreement between the state of mind and that which is known. Such a determination of mutual agreement in co-operative conduct is indeed essential not only to this conduct but to what is called "thinking" in the individual, but it is not a discovery of that which needs to be known. It is at most a part of the technique by which the discovery is made. When the discrepancy arises, we must discover what the import of the symbols is, and here real knowledge takes place. We find out what the other person is referring to—in common parlance, what he means—but the process can go on without discrepancies. The other indicates to us what is there, and our so-called consciousness of this

need not introduce any reflective attitude in our conduct. To call the correspondence between the attitudes involved in pointing out a savage dog and the conduct which takes place "knowledge," whether one points it out to one's self or to another, is to give to "knowledge" an entirely different value from that involved in discovery.

In any education that is worthy of the name, what is acquired does go toward the solution of the problems that we all carry with us, and is the subject of reflection, and leads to the fashioning of new hypotheses and the appearance of new objects; but this takes place after the communication which is the mutual indication of objects and characters by the use of gestures which are common symbols, that is, symbols with identical references. The correspondence theory of knowledge has grown up around the recognition of the relation between that which the symbol refers to in the object and the attitudes of response in others and in ourselves. There is here a one to one correspondence, but the relation of these objects and their characters to what we can infer from them in the discovery of the novel element which meets our problematic situations is of an entirely different sort.

In this "meeting of minds" which takes place in conversation, learning, reading, and thinking, there are generally present problematic situations and discovery, though this is by no means always the case. If someone informs us that an expected acquaintance has arrived, there is no more of a problem, or discovery in the sense of a solution, than would be involved in the friend's appearing around the corner. The varied landscape and hurry of events that sweep us along in books of travel and adventure embrace no more of reflection than the travel and adventure in which we are involved. A great deal of learning is a direct following of indications, or a gradual taking-over of the form and technique of others that goes on without inference. A good deal of thinking even, notably much of reverie and also straight-away ordering of conduct in an unquestioned situation, may be free from dubitation and ratiocination. A field of concentrated inferential thought does include the common reference

of symbols in conversation, writing, and thinking—in other words, that part of logic which has to do with the technique of communication either with others or with one's self—together with the epistemologies and metaphysics which have sprung from this and obscured it with their tangled and forest growth. Here lie the problems of successful reference to identical objects and characters through identical symbols mutually employed by different selves, and these problems are of peculiar interest and importance to those involved in the exact and mathematical sciences. These problems demand theories of definition and implication, in so far as this does not depend upon the concrete content of that to which reference is made.

The environment of living organisms is constantly changing, is constantly invaded with other and different things. The assimilation of what occurs and that which recurs with what is elapsing and what has elapsed is called "experience." Without anticipating a later discussion of the social nature of the self and of thinking, I shall claim that the analysis of experimental science, including experimental psychology, never operates in a mind or an experience that is not social, and by the term "social" I imply that in the thought of the scientist the supposition of his mind and his self always involves other minds and selves as presuppositions and as standing upon the same level of existence and evidence. It may be that the scientist, in a self-centered moment, might think away all else but his self and its thinking, but even if in imagination he succeeded in annihilating all save the dot on the *i*, its having any thoughts at all would depend entirely upon its preserving its previous habits of conversing with others and so with himself; and, as this precious hoard of past experience wore away under incessant use and decay, the dot would follow the *i* into nonentity. The dividend that I wish to see declared on this social nature of mind and the self is the equal immediacy that may attach to the assimilation of others' experience with that of our own. We so inevitably utilize the attitude of the other, which is involved in addressing ourselves and in attending to him, that we give the same logical

validity to what he relates of his experience as that which we give to what we relate to ourselves of our own past experience, unless on other grounds we are occupying the seat of the critic. It has, of course, only the validity that attaches to a relation, and is one remove from the assurance that attaches to the so-called memory image. But this validity at this remove is all that we can claim for most of our memory. Memory images constitute but a minute part of the past that stretches out behind us. For most of it we depend upon records, which come back to one form or another of language, and we refresh our memory as really in inquiring of a companion what took place on a certain occasion as in questioning ourselves. His testimony may not be as trustworthy as our own because of difference of interest and possible prejudice, but on other occasions for the same reason his testimony may outrank our own in reliability. While the actual image of the event has an evidential character that is peculiar, not infrequently it may be shown by the testimony of others to have been the product of imagination or to have been shifted from its proper place in the record. But still more fundamentally, the building-up of a memory record involves, in the first place, a social world as definitely as the physical world, within which the events took place, and involves, in the second place, experience which was actually or potentially social in its nature to the extent that whatever happens or has happened to us has its character over against actual or possible audiences or observers whose selves are essential to the existence of our own selves, the mechanism of whose conversation is not only as immediate as our replies but, when imported into the inner forum, constitutes the mechanism of our own thought.

I am anticipating the detailed presentation of this doctrine of mind to make clear my distinction between information and knowledge as discovery through inference. Information is the experience arising from the direction of attention through the gestures of others to objects and their characters, and cannot be called "knowledge" if that term is denied to perception as im-

mediate experience under the direction of the attention springing from the organic interest of the individual. Perception is not itself to be distinguished from information, in so far as one uses a social mechanism in pointing out objects and characters to himself as another. The perceptions of a self may be already in the form of information. Logically stated they exist in a universe of discourse. Knowledge, on the other hand, deliberately fashions hypothetical objects whose reality it tests by observation and experiment. The justification for this is found in the actual disappearance of objects and their characters in the problems that arise in conduct.

Actually so much both of perception and of information is shot through with reflective construction and reconstruction that it is difficult to disentangle them from each other. It is, however, a part of scientific technique to accomplish this disentanglement. Observations and experiments are always in the form of information, even while they are being made, but they are scrupulously teased out from the web of inference and hypothesis. From this purity depart in varying degrees our perceptions as well as our information. It is a commonplace that one may be very well informed and do very little thinking, indeed be quite helpless over against a situation in which the information must be used to suggest or test hypotheses. The reliability itself of the observation or information, however, does call for a certain sort of verification, that of its repetition, either in the experience of the individual or in the mouths of other witnesses, and here, as above remarked, we find the source of the copy or correspondence theories of knowledge. Indeed, if information is knowledge, the copy theory of knowledge is entirely legitimate.

In presenting the world that is there as in some sense surrounding what is problematic, it was stated that what had in the past been approved by experiment and observation was taken up into this world and resided there as organized objects, things behaving toward one another in expected manners. Over against these unquestioned things lie the elements and relations

of the working hypotheses of science. These are in a peculiar degree the objects of our knowledge. They are still lacking in complete verification. They are received only provisionally, and the objects which we constitute by means of them are complex hypotheses anticipating further tests in the use which we make of them. While they work, they pass as objects, but always with a proviso attached, which keeps the scientist's attention alive to possible departures from the result which the hypothesis implies. He is looking for such departures and eager to find them. In such far-reaching speculations as those regarding the structure of matter this field of knowledge is enormously extended, though it does not actually include the world within which the observation and experiment themselves take place, though the analysis which the investigation involves extends into the world of unquestioned things. For the purposes of our calculations we state the apparatus of our laboratories, for example, in the same terms which we use in our hypothetical constructions and thus seem to bring them within the scope of the investigation. But the scientist is in no doubt in regard to the distinction between the finding of fact and the hypothetical form in which he has stated things which are there, irrespective of the validity of the expressions into which they have been translated. Such translations may be perhaps called "objects of knowledge," though with the recognition that the success or failure of the hypothesis, into the terms of which we have translated these unquestioned things and their processes, does not affect their reality in the observation or experiment. In this sense there is no limit to the field of knowledge, for we may state the whole universe in terms of such working hypotheses, if we only remember the limits of this formulation. But it is also necessary to recognize that the *raison d'être* for translation is found in the function of the apparatus of experimental science and not in the revelation of reality. What reveals this latter fact is the ineradicable difference between the immediate concrete event to which appeal is made in experiment and observation, and any formulation of this in terms of a current working hypothesis.

The actual position of the spectral line, or of the photographic image on the plate, is the brute fact by which the hypothesis is tested, and there is no methodological relation between the exactly determined position of these and a resolution of them into, say, electrons. It is conceivable that this should be done. It would vastly confuse and delay the attainment of any knowledge from the measurement and would have no conceivable connection with getting that knowledge. To call such a translation "knowledge" is to depart from the significance which the term "knowledge" has in an experimental science.

The world, then, in which science operates has, at its core and in a certain sense surrounding its findings and speculations, the environment of immediate experience. At the point of its problems the immediate things are so analyzed that they may pass into the formulations of the scientist's hypothesis, while the finding of observation and experiment remains immediate experience, that is, is located in the surrounding borderland. It is these two aspects of the world of immediate experience that call for especial attention. From the standpoint of the discovery of the new, from the standpoint of research, the world of immediate experience is a core and seems to be reduced to the island of vague, indeterminate, and contingent data that are contrasted with the clear-cut, sharply defined, and necessary elements and events of scientific theory; an apparently incongruous situation, for the acceptance of the clear-cut, sharply defined, and necessary world is dependent upon the findings in the island of vague, indeterminate, and contingent data, the field of observation and experiment. It is an apparent incongruity that has given birth to much philosophic speculation.

That the incongruity is only apparent is fairly evident, since the scientist, out of whose method and its achievements it has arisen, is not aware of it. If it were presented to him in the terms just used, he would presumably reply that one cannot both have his cake and eat it; that, if one is in search of definition and certainty at a point in experience at which they have disappeared, it is but natural that the definition of the problem

should exhibit this fact of their disappearance and that the very data which will serve in the verification of a hypothetical order of defined and necessary things must be themselves infected with indeterminateness and contingency, that the home of experimental medicine is in the hospital; that the gospel of science summons not the logically righteous but sinners to repentance. He would likely add, however, that because, before the discovery of the germ of yellow fever, the clinical picture of the disease was indeterminate and its incidence contingent, there would have been no justification in ascribing the same indeterminateness and contingency to the clinical picture of diphtheria—in other words, that the form in which the data appear in any one problem is pertinent to that problem alone.

But while the statement of the problem, together with the observation and experiment that are involved in verification, constitutes a core of immediate experience whose analyzed elements are indeterminate and contingent as compared with defined elements and necessary relations in a hypothetical scientific theory, these data do belong to objects in an immediate world that is a going concern, and as such is unquestioned. Such a world may be said to contain the problem within itself, and so to surround the problem. It has taken up into itself the solutions of past problems successfully solved. There is involved in it also a considerable apparatus of working hypothesis, which is not always distinguished from the world that is there. The distinction lies in the fact that back of the working hypothesis there is always a question mark, and in the back of the scientist's mind in using the working hypothesis lies the problem implied in its being only a working hypothesis. The world that is there is the common world within which the intelligent community lives and moves and has its being. In physical diameter it may be a small world as compared with the scope of physical hypotheses which in a logical sense it surrounds. Its logical compass of the hypothesis is shown in the data of observation and experiment that must be brought to bear upon the hypothesis before it can be established.

This compass of the problem, and the hypothetical solution of it, is logical in so far as the analysis involved in the problem, the inference involved in the formation of the hypothesis, and the sufficiency of evidence involved in observation and experiment all rest upon a world of things that is there, not as known but as containing conditions of knowledge. But the world that is there includes and surrounds the problem in the sense that the problem is also there within the field of conduct, for, as has been indicated, the problem arises in the conduct of individuals and out of the conflict of acts which inhibit one another because the same object calls out mutually antagonistic responses. When these problems pass into the field of reflection, they are so formulated that they would occur in any experience, that is, they take on a universal form. Such a formulation is essential to the reflective process of their solution. Their actual occurrence, however, in the world that is there awaits the advent of the conflict of responses in the experience of some individual; and the solution as well, inasmuch as it departs from the common or universal habits of the community, must be an individual achievement before it can become the attitude of all and be thus universalized. So located in its historical setting, the problem is evidently as completely surrounded by the world that is there as the hole left by a name that has been forgotten is surrounded by all the other names and things and happenings by which one attempts its recall. But while occurrence of the problem and of its solution must be in the field of conduct of some one individual, the things and events that constitute its border are matters of common and undisputed validity. The problem must happen to an individual, it can have no other locus than in his biography, but the terms in which he defines it and seeks its solution must be universal, that is, have common import.

This location of the problem in the experience of the individual in its historical setting dates not only the problem but also the world within which that problem arises. For a world within which an essential scientific problem has arisen is a different world from that within which this problem does not exist,

that is, different from the world that is there when this problem has been solved. The world of Daltonian atoms and electricity (which was considered a form of motion), within which appeared the problem of the ion in electrolysis and the breakup of the atom in radioactive substances, is a different world from that whose ultimate elements are particles of electricity. Such worlds dated by the problems upon whose solutions they have appeared are social in the sense that they belong to the history of the human community, since reflective thought is a social undertaking, and since the individual in whose experience both the problem and its solution must arise presupposes the community out of which he springs.

It is the double aspect of these worlds that has been the occasion of so much philosophic speculation. On the one hand, they have provided the tests of reality for experimental science, and, on the other, they have successively lost their validity and have passed away into the realm of ideas. I have already indicated the scientist's rejoinder to this apparent assault upon his method. His method implies not that there has been, is, or will be any one authentic world that constitutes the core and envelope of his problems, but that there always have been, and are, and will be facts, or data, which, stated in terms of these different worlds by the individuals in whose experience they have appeared, can be recognized as identical; and that every world in which problems appear and are attacked by the experimental method is in such a sense a going concern that it can test hypothetical solutions. I have further insisted that as a scientist his goal in the pursuit of knowledge is not a final world but the solution of his problem in the world that is there.

There have existed two different attitudes toward these so-called facts or data. Because it has been assumed that the observations of the old watchers of the heavens in the valley of Mesopotamia, and of Hipparchus, and of Tycho Brahe, and present astronomers possessed a certain identity, there has arisen a picture of the world made up of that which can be regarded as common to all, a picture made of abstractions. It is

a picture through which we can look before and after, and determine the date of Thales when he predicted an eclipse, and what eclipses will take place a thousand years hence. If we assign a metaphysical reality to these facts, we reach a universe which has been the subject matter of popular and technical philosophies. If, on the other hand, we restrict ourselves to the determinations of experimental science, we have nothing but the common indication of things and characters in a world that is there, an indication that abstracts from all but that which is there when a problematic situation has robbed it of some object and concentrates attention upon those characters and things which are the stimuli to mutually inhibiting responses. As I have already insisted, it is only in the experience of the individual, at some moment in that experience, that such a conflict can take place. Nonproblematic things are there for everyone. But while these observations took place in individual experiences, in the experiences of those individuals for whom these problems arose, it is the assumption of experimental science that a like experience would have arisen for any other individual whose experience had been infected with the same problem and that, in so far as successive problems have involved identical problematic elements, it is possible to identify the same observation in the experience of different individuals.

The Mesopotamian soothsayer who had hit upon the succession of the eclipses and enshrined it in the Great Saros, and the Greek astronomer who by a scientific explanation of the eclipses had worked out the same succession, and the modern Copernican astronomer who substitutes the motion of the earth in its orbit for that of the sun about the earth and dates these eclipses still more accurately, were all observing the same phenomenon. For each there was a different world that was there, but in these worlds there were actual or identical observations of individuals which connect these worlds with one another and enable the later thinker to take up into his own the worlds that have preceded his. The common content of these observations, by means of which different worlds are strung together in

human history, depends upon the assumption that different individuals have had or would have the same experiences. So far as there is any universality in these contents, it goes back to an actual or implied indication of the same things and characters by different individuals, in the same or like situations, that is, it goes back to implications in regard to social behavior in inferential processes, especially to the social nature of the knowledge or evidential import of observation.

However, the experimental scientist, apart from some philosophic bias, is not a positivist. He has no inclination to build up a universe out of such scientific data, which in their abstraction can be identified as parts of many different worlds. The reference of his data is always to the solution of problems in the world that is there about him, the world that tests the validity of his hypothetical reconstructions. Nothing would more completely squeeze the interest out of his world than the resolution of it into the data of observation.

IV

CONSCIOUSNESS AND THE UNQUESTIONED

IT IS not surprising that in our reflective experience the world should present itself as an object of knowledge, for it is there primarily as the locus of a problem; and, when the problem is solved, if it is solved, it will be a different world from that which preceded the appearance of the problem. That part of the world that is there, upon which our interest is intensively occupied, is an organized group of data. From one standpoint these data are simply there—are brute facts—but from another standpoint they are the conditions of the discovery which constitutes knowledge. They are, in fact, the statement of the problem. And the analysis which has isolated them as data runs back and forth in the construction of hypotheses through the world that is there, and hypotheses are the very stuff of our knowing. The return from the hypothesis to the world that is there is by way of an experiment or observation, and these are elaborately constructed situations, devised to exactly engage the elaborate structure of the hypothesis. The world that is there, as well as the hypotheses, is there as the sum of the conditions of knowledge, and the scientific imagination sets no limits to the analysis except its possible usefulness in providing material for hypothetical reconstruction. The whole world as the locus of the problem and as providing the means and conditions of its solution is dedicated to knowledge. The very assurance and solidity of the world that is there we realize in the inevitability of the problem and in the finality of the appeal to it in terms of experiment. It is but natural that we should say that we advance from the unknown to the known, meaning thereby that the unknown will cease to be unknown when it has proved itself a part of the world that is there. If that which we are engaged in discovering is unknown, what is there and needs not

to be discovered is by a Platonic dichotomy the known. It is the not-unknown.

This is peculiarly the case in regard to that which occurs only in the experience of the individual. Here belong the first appearance of the problem, the hypothesis, and the observation and experiment. It is not a vain repetition to insist that this distinction is a logical one. To everyone the world that is there is in varying degrees different from that which is there for every other, because of each one's location and perspective. But it is the location and perspective that are responsible for this. One still looks upon it with a universal eye, and especially its contacts are those of all men. Now the familiar analysis of this situation starts with this common world and then proceeds to give every man his own position within it, and thus assigns to him his perspective; and then too often turns about and, ignoring the field that was there as the pre-existent condition of these assignments, neatly joins them one to the other and presents the whole thus secured as the original demesne, gathered, of a truth, out of the private experiences of men, none of whom may ever traverse the boundary of his own allotment.

In the interest of the world that is there I protest against this *suppressio veri*. When the psychologist abandoned the armchair and habilitated in the laboratory and the dissecting room, by implication he forsook this ideology and all its works. Unfortunately he slips back, betimes, into Hume's study, and there in his armchair, by essences, credences, and acknowledgments, builds up an insubstantial pageant to supersede the solid world where alone his experimental science is at home.

The fundamental assumptions involved in the account of knowledge that I am presenting are: that it is a process of finding something that is to take its place in a world that is there, which world that is there is the presupposition of the undertaking that we call "knowledge": that the world that is there is a temporal world, i.e., that it is continually passing, or is a world of events; that the world is therefore continually ceasing to be as it passes into the world of the following moment, but that passage can

be distinguished from change, for we can by abstraction indicate passage in which there is no change: that things are events in which there is no change, or in which no change is indicated: that the ceasing to exist does not take place instantly but continuously and that there is a span within which the world while passing does not cease to exist, though this span cannot be exactly indicated but is taken as relative to what the psychologist calls the specious present—this specification recognizes the human individual experience as a part of the world, and also a distinction between what the individual indicates to himself and the process of indication. This process of indication, as has been already stated, is primarily a piece of behavior toward another individual which the human individual comes to use toward himself. It is conduct which places him in the position of an object to himself. He indicates what his own organism and self are doing. Thus there is not only the flight of a bird before the individual but also the marking to the individual of the separate positions of the bird within his so-called apperceptive grasp. Such a set of indications to himself, which marked the limits of the immediate change in his experience, is the so-called specious present. It defines the limits of the span within which temporal passage does not transcend existence for this individual's experience. The limits of this span are uncertain because it so connects with the coming experience that there is no break in the temporal continuity, and because the passing experience goes over into memory imagery so imperceptibly that with difficulty he draws the line between them. The functional reason for this lack of definition in the span of temporal existence is that as a datum it never plays a part in conduct. The unit of existence is the act, not the moment. And the act stretches beyond the stimulus to the response. While most of our acts stretch into the world that does not yet exist, they inevitably include immediate steps which lie within the existent world, and the synchronizing, with recorded elements in some uniform process of change, of attitudes in the act by means of the indication of these to the self, affords the only

approach to the definition of the span of existence. If we wish to determine this span, we take attention from what is about to take place, the natural attitude of conduct, and fasten it upon some organic process such as pressing a telegraphic key, which we indicate to ourselves by means of a symbol, a word, or an anticipatory image, and which can be synchronized with a record of some uniform change, such as the rotation of a drum, thus fixing one end of the span. We then report to ourselves what we can grasp of a movement all the elements of which are within the experience. If the attention were simply upon the change before the eye, it would pass ceaselessly on with the change, but by noting our reactions by self-recording symbols, we cut out the so-called specious presents within which in our experience changes have persisted. These vary with different individuals and within the experience of the same individual. The relation of these to one another, and to an assumed absolute span of existence and to the spatial phase of extension, would seem to be the central problem of relativity, consideration of which must be, for the time being, postponed. It is of first importance to stretch this span out into past and future. In the first place, these *are* given in the successive phases which are there in the span of existence. Memory and anticipation build on at both ends. They do not create the passage. In the second place, the unit of existence in human experience is the act, within which nothing is there that does not involve successive phases. There are no static elements. There are things that do not change although they pass. These are but two sides of the same situation, at least in the world that is there. There is no thing that does not change, except in so far as it passes, and there is no passage, except over against that which does not change. Motion, or change of position, is a change of that which in certain respects remains without change, while change of quality involves that whose substantial character remains unchanged—but neither takes place except in passage. Abstractive thought isolates these phases of the world that is there. In this abstraction there is pure passage, or temporal extension, and what

passes is an event which has no other character except that it passes and may be the seat of a contingent quality as well as of a timeless object which does not pass. In experience in the world that is there these abstractions are emphases of attentive thought (or reference, or indication). What takes place in that world involves all these phases. All are essential to what takes place in the world that is there. These emphases take place in the experience of the individual and belong to his conduct, and may certainly be considered from that standpoint.

It has been perhaps sufficiently emphasized that the world that is there is a presupposition of knowledge, but it may not be amiss to orient the experience of the individual with reference to this world, following out the implications of experimental science. Observation, hypothesis, and experiment lie, as we have seen, in the biographies of the individual, and, as has been just indicated, so do the emphases of attention which mark analysis and the process of so-called logical thinking. In all of these, however, there is material which is there, irrespective of its appearance in the experience of the individual. It is the assumption of experimental science that that which is there in the experience of the individual alone is due to his perspective, or to the emphasis which his attention isolates, as distinguished from hypothetical objects and the process of their construction, a process which includes both imagination and thinking, in the ordinary connotation of these terms. The thought which isolates the characters of things is felt to be operating in the world that is there, but the Bohr atom as an object is felt to have its habitat in the mind of Bohr, and in those minds which utilize it as a working hypothesis. The same habitat would be assigned to the Daltonian atom, together with the Ptolemaic world, and an electrical fluid. The attitude of the experimental scientist, unless he has become obsessed with epistemological and metaphysical problems, undoubtedly finds the hypothetical or erroneous character of mental contents, in so far as he distinguishes them from the world that is there, in their actual or implied future reference. I am for the time being postponing

the consideration of imagery. I do not imply that the experimental scientist would consider the future and the past mental. As we have seen, they are involved in the succession of events which fall within the span of experience, but uncertainty attaches to what is built both on to the future and on to the past that is there, in greater degree to the future than to the past. I do not mean that he is uncertain of there having been a past or of there being a future, but any anticipated events and any remembered or recorded events are infected with varying degrees of dubiety, and, whatever mind is, its important function for him is that of directing intelligent conduct with reference to what is uncertain or problematic.

In so far, then, as the act reaches out beyond the future that is there and employs a revived past, it passes into a realm that is uncertain. Action that employs the past, acquired or inherited, in reducing that uncertainty from the standpoint of the result toward which the act moves, we call "intelligent" in the most general sense of that word. Such intelligence, which is almost coextensive with life, far exceeds the domain of mind, but it marks the field within which mind operates. Nor is all of human intelligence mental. Not only do our inherited and acquired habits exhibit manners which do not disclose mental operations but a great deal of direct inference lies outside of the processes ordinarily termed "thinking." This may run foul of some logical doctrine. I am not, however, formulating a logical classification but indicating the gradual passage of intelligence from its more universal form into that of reflective thinking. Mind does imply a process that lies in the conduct of an individual. It deals further with things and characters whose indications the individual refers to himself. That is, it is essential to the process that he should be thinking of them. Mental processes imply not only mind but that somebody is minding and that the objects of these processes are dependent upon the emphases and selections of this individual.

It has been customary to recognize the gestures or symbols by which the characters of things are analyzed in mental processes

as individual. The study of them is the office of psychology. The characters which are indicated by these symbols (and so abstracted, lying in the mental process) have, by psychological philosophers, been placed also in mind as a habitat. If the treatment is psychological, that is, is a statement of what goes on in the experience of an individual in abstraction from the social and physical nexus of which he is a part, these characters, abstracted by attention and indication, are termed "concepts," and following the fashion of the particular school of psychological philosophers will be stated in terms of association or of organization of response or habit. If that which is indicated, as well as the mechanism and process of indication, is placed in the individual, the world in so far as it is significant has been moved into the individual, and a solipsism is the metaphysical outcome. If the individual is generalized to answer to the universal character of these objects, an idealism results.

The experimental scientist in the practical pursuit of knowledge is not interested in the metaphysical result of taking what is indicated by means of a psychological mechanism out of the world that is there and naturalizing it in the individual. He is very much concerned with the individual processes of emphasis of attention and of concentration of interest, and with the operation of the mechanism of symbolization, but he has no preoccupation or prejudice which leads him to locate the characters of things, which his analysis has isolated, inside of himself instead of in the things where his analysis found them.

The scene changes, however, when he is dealing with the actual solution of his problem. Here he has before him the old object, which has been discredited in the field of observation by the exceptional instance, and the tentative object, which he is constructing in hypothesis to take its place. Reverting to the earlier illustration, he has before him the discredited object yellow fever spread by contagion and yellow fever spread by a hypothetical parasite. The experimental scientist would unhesitatingly say that both these are ideas and exist in his mind. One is an idea because it has been proved false by experimental

evidence, and the other is an idea until it has been proved true by experimental evidence.

As mental objects these are referred to worlds in which they were not mental, or will not be mental. The discredited object did exist in the past, and the hypothetical object must exist, if it is to exist, in the future. They do not exist in the world that is there. Ideas, then, in so far as they are typified by these illustrations, constitute the form in which past objects and future objects, which are not objects in the world that is there, may exist in the minds of individuals. The condition for their existing as ideas in the minds of individuals seems to be that the mechanism of conduct in which they did function or in which they will function exists in these individuals, which logically is as much as to say that these objects are significant.

If these objects are not things in the world that is there but are ideas in men's mind, what in simple truth are they? Yellow fever as an infectious disease in the world that is there calls out, or tends to call out, the response of quarantine. This protective reaction is, however, inhibited by the responses which numerous observations have aroused. These inhibitions are as yet located only in the individuals who have made or have had access to these observations. Yellow fever as a contagious disease is an idea in the mind of the man who has, on the one hand, an organized response of quarantine and, on the other, responses, called out by observation, toward the disease which inhibit the quarantine response. As an object to which there exist these conflicting responses, it is not in the world that is there, at least in so far as this includes the individuals who have made these observations. For the time being it is confined to the experience of these individuals. It is not in the social or so-called common world. Because he does not react to the disease by quarantine, the scientist calls its contagious character an idea, though the group of characters which calls out this response are there in the world that is there. It is in his mind in so far as in his particular organism the quarantine response and the inhibiting responses are present. The grouping of the characters answering to the

quarantine response is mental because one does not act upon it, not because they are of mental stuff or have a habitat in an unextended mind. The same type of analysis applies to the hypothetical object, until the characters of things are so organized that the scientist reacts to them in experiment.

The mental character of the idea has, then, two aspects: one, a group of characters of things that are there which call out a response, and, on the other hand, a response that is inhibited in the individual by other responses which other groups of characters call out. It is the particular grouping that is mental rather than the characters themselves. The cleaning-up of Havana and the quarantining of those who contracted yellow fever were responses which answered to a certain grouping of characters which yellow fever possessed in common with other so-called contagious diseases. When these measures failed to arrest the epidemic, other ways of reacting to the disease inhibited these ineffective precautions. There are, then, in nature objects which represent the adaptation of organisms to their environments, and which cease to be such objects when that adaptation ceases. Yellow fever was a contagious disease when the medical response to it was that of quarantining. This, at that time, was not due to a mental attitude. It expressed an actual situation. There was, to be sure, no such thing as food when there were no organisms capable of ingesting, digesting, and assimilating it. It is equally true that there is no food when in the presence of such organisms there is no nutriment present. Food as an object exists in a certain biological situation, in which are found both the organic forms and the environment in adaptation to each other. Nor is the dependence of objects upon situations confined to biological objects. Mass or electricity as objects in experience only exist in virtue of systems within which they become recognizable masses and electrical charges. When these situations change, new objects arise and old objects disappear. The development in certain animals of a digestive tract rich in ferments turns cellulose-covered plant protoplasm into a food, while the absence of such a digestive apparatus excludes these

plants as food objects from the dietary of other animals. What takes place in the processes of biological evolution occurs more swiftly in the adaptation of human individuals and their surroundings. What was a contagious disease disappears, and another disease that is to be fought by the elimination of a certain mosquito instead of by quarantine appears in its place.

What we denominate as "mental" in such a situation is the inhibited response together with the imagery of the result of the response, in so far as these are indicated to the self or others by the use of language symbols.

The inhibited response, however, must not be taken apart from the situation within which it exists. It implies a set of things and characters of things to which the scientific medical man reacts in a certain sort of a manner. The relation between this reaction and the thing and its characters is quite the same as the relation already pointed out between the nutritive process of an animal and food objects. It is objectionable to speak of the food process in the animal as constituting the food object. They are certainly relative to each other. With any essential change in the situation which involves them both, each changes. There are elements in each which we refer to the other, as the analysis shifts. I am considering now the world that is there. From one standpoint we place the nutritious character of the food in the object, and again we locate it in what goes on in the animal's nutritive system. From the latter standpoint it lies in the capacity of the animal to free the protoplasm from its cellulose covering. If change invades the situation from the outside, we think of the animal as remaining without the appropriate object, and evolution may take place by a gradual adaptation of its apparatus to the new situation. Or a variation in the apparatus of the animal may lead to the evolution of a new object of food value in the environment. So, following Professor Alexander, the various so-called sense qualities of things may emerge with the development of sense apparatus, while the possibility of their appearance is equally dependent upon the so-called physical conditions in the situation. And this holds

for what goes to constitute experience as well. Whatever has passed from past conduct into the situation belongs to the situation as a whole. The acquired skill of the animal is definitely seen in the new objects that appear. Imagery so far as it passes into objects belongs to them as objects as genuinely as their visual and tactual characters. The thing that one sees as hard has this hard content in it as genuinely as it has in it the color whose nuances we speak of as responsible in some sense for this character of hardness. There may be tactual imagery, as this term is ordinarily used in psychological analysis, or this analysis may find motor imagery alone. I am at present only insisting that this character is in the same sense in the object as that in which we identify the color and feel of the object as characters of the object. An ideological analysis may locate all these characters in the mind or consciousness of the individual who is said to perceive the object, but it may not locate the imagery in the individual while it leaves the color and feel out there in the thing. On the assumption already made of these characters emerging with the situation, we must also recognize the emergence of this so-called imagery as a part of the same situation.

It is not unlikely that the comment may be made that what is here referred to as the appearance of a situation is in reality the appearance of consciousness and that consciousness is something more than a situation. There may be consciousness of a situation, but surely consciousness is not a situation. At this point I can do no more than summarily state my position and leave the further support of it to later discussion.

"Consciousness" as currently used has two imports. It is used in the sense of awareness, a consciousness of. It is also used as constituting a certain content which attaches to the experience of the individual. There are two disparate motives that have operated in the determination of this latter sense of consciousness. One is found in the distinction between the primary and secondary qualities.

The color, sound, taste, odor, and temperature of an object are characters which are not simply there. Some of them may

be regarded as distance stimuli which control our conduct with reference to possible contact experiences. The value of this relation is of primary importance in all conduct. A translation of this is found in the affirmation that the object is what the outcome of the act reveals it as being, while the distance characters of the object are regarded as appearances of this ultimate experience. The book viewed from a distance seems to be there. It is there if the act which vision initiates ends in grasping the tangible volume. This position is generalized and systematized by the findings of physical science, which states all characters of extended things in terms of the motions of physical particles, whose essential being is an extended resistance, and which could without contradiction be imagined as there for a sufficiently refined contact sensibility. If the organism were so reduced in size that it could find itself in the perceptual relation with the whorl of atoms or electrons even that make up physical things, these particles could not subtend a ray of light or be individually responsible for the experience of any other distance character, while such a minimized organism would still be in the perceptual relation of impact with these ultimate elements of things. We can freely imagine an indefinite division of extended resistant matter, while all other characters which imply relations at a distance from these particles would inevitably disappear with continuous subdivision. If, then, the reality of things is to be found in these ultimate elements, these other characters must be lodged somewhere else than in the things. They have been placed in consciousness. Consciousness becomes our experience of things not as they are but as they impress us from a distance which we can never overcome except in imagination.

Consciousness becomes identified with the content of objects as appearance when that content is defined as those distance characters which invite us to the action which leads to or avoids contact, though we must recognize that these distance characters include those immediate contact characters which stimulate us to that crumbling analysis which advances toward the finer elements of things. It is evident that this import of con-

consciousness as appearance carries with it the implication of "appearance of," which is one of the connotations of what has been already referred to as awareness. The other import of "consciousness" is found in those contents in experience which belong to the self, whether the self is regarded as physical or social, or, as is usual, as both. I have already pointed out that the self appears in the social act and is a derivative of the gesture, that is, the indication by one individual in a co-operative act to another of some thing or character which is of mutual interest. When, as is the case in the human individual, he can address himself as he addresses another, and so take both attitudes, that of the one who indicates and that of the one who is indicated to, the one, who is indicated to, becomes a social object on the same plane with the others. When the memory of the indication associates itself with this object, the self has appeared. Now the most common reference of consciousness is to the peculiar character of this self as distinguished from other objects. Thus we refer to consciousness in general as the capacity of distinguishing things, i.e., pointing them out to ourself, and so speak of losing and gaining consciousness. Here is found the basis for awareness. What the individual indicates to himself, he is aware of, though this latter is the relation of the self to the object after he has so indicated it. Furthermore, in the process of conduct in which he observes himself acting over against other things and persons, what belongs peculiarly to the agent, who has thus been brought into the field of experience as an object, will be called "conscious." His attitudes, their stresses and strains, and affective tones, he is conscious of while he sees and hears what goes on about him. Finally, the inner conversation of significant symbols, which we call "thought," and the flow of imagery in reverie, the one involving the self in its double capacity and the other attaching to the self as its past history, constitute a central core of what is called consciousness.

There seems to be no community between these two imports of "consciousness"—that of appearance and that which belongs to the self—except that the second, the experience that attaches

to the self, has provided a field within which a certain philosophic doctrine has placed what has been termed "appearance." Locke placed the secondary qualities in consciousness, while the primary qualities were supposed to belong to the nature of things. Subsequent ideology found itself obliged to transfer the primary qualities to the same field but postulated possible non-mental things to which they answered, while uncritical scientific thought has remained much in the position of Locke.

The position which I have sketched recognizes these two uses of "consciousness" as entirely disparate. The thing at a distance is there as genuinely as that which the hand grasps or the physical particles into which it may be crumbled. It is there, but it is there as a distant thing. As a distant thing it is the promise or threat of possible contact experience, but this promise or threat of contact experience neither abrogates its distance characters nor transfers them to a mind to become states of consciousness, though the final contact is the experimental evidence of the reality of the promise which the object at a distance carried. In so far as imagery of past experience has passed into the perceptual object, this object may be denominated a collapsed act, but both elements are there in the object. Doubt or question transforms the contact value into a hypothesis, to be tested in actual conduct. In so far, the contact value becomes mental, but this does not render the distance values mental or justify the reference of them to a self as states of consciousness. What seems to justify this reference is the substitution of the material particles with a content of contact experience for the distance experience in the physical theory of the perceptual situation. Physical theory states its objects in the ultimate form which the experimental test implies, but when it places underneath the color the whorl of molecules, atoms, or electrons, which imagined experience would reach if it came into contact with the structure of the thing, it no more abrogates the color at a distance than the feel of the red book deprives it of its redness. We recur to the situation as illustrated in terms of food. As grass is food in the situation constituted by its relation

to the ox and is not food in the situation constituted by the tiger, so the distant object is colored in the perceptual situation constituted by its relation to an individual with our visual apparatus but is not colored over against an angleworm.

The only identity of this situation with consciousness is found in the hypothesis in the mind of the scientist that motions of physical particles are the contact representatives of the color, in case the imagined perceptual responses could be all carried out. This hypothesis is mental, and in the current use may be termed "conscious," but this hypothesis in no sense nullifies the thereness of the color at a distance in the perceptual situation, nor do we in our use of the scientific theory assume this except in so far as we have entangled ourselves in epistemological subtleties.

Experimental science, then, recognizes objects as existing, and arising, in situations, and a situation may be defined as things in such a relationship with one another that they maintain or tend to maintain that relationship. When a new situation arises, new objects arise. Because science, in seeking experimental evidence, analyzes objects into elements which abstract from this situation, and states these objects in terms of these elements, it does not imply that the objects are not there, or that they are there only as appearances existing in another medium such as a consciousness. Such a situation is that which falls under the summary expression of life, and such new objects are the species and individuals that appear there. Because science analyzes living objects into inorganic elements, it does not assume that animals and plants are in reality nothing but complexes of physical particles or that the more than these particles and their relations as particles are to be located in mind or consciousness. Among the objects that so arise in the perceptual situation are things with so-called sense qualities, but these are not placed in the head or in a conscious epiphenomenal stream that parallels the dance of molecules in the central nervous system, because physical and physiological science chooses to isolate these molecules in its observational and experimental

formulation of what takes place in this situation. If plesiosaurs and rhododendras can arise in the organic situation, surely all the colors of the spectrum may arise, and all the odors of Araby.

Science also recognizes that, in so far as the effects of past conduct of any individual form remain in increased facilities of response and greater sensitivities to stimulation and (in more complex organisms) in the presence of imagery, this may lead to the appearance of a new situation, with new objects, and that this situation and its objects are as genuinely there as that from which it arose, or any analysis into more abstract elements. Nor is it, as experimental science, called upon to find in invention and discovery anything more than a singular speeding-up of this history. What renders it singular is that the social human individual, has, thanks to his apparatus of social conduct, become an object to himself, so that he is able to indicate to himself characters and things as stimuli, and inhibited responses to them, by means of significant symbols, and thus organize possible situations with their objects. These are there as selections and organization of stimuli and symbolized responses only in his own situation and dependent for their achievement upon the situation's maintaining itself in individual and social conduct. Through the rising of a new situation in the selection and organization of stimuli and their inhibited responses in the conduct of a socialized individual, I have sought to trace what is peculiar to the individual in the mental process of knowledge as discovery.

V

FRAGMENTS ON THE PROCESS OF REFLECTION¹

REFLECTIVE thinking arises in testing the means which are presented for carrying out some hypothetical way of continuing an action which has been checked. Lying back of curiosity there is always some activity, some action, that is for the time being checked. The problem is always a stoppage of something one is doing by the excitement of some other action. The solution of the problem will be some way of acting that enables one to carry on the activity which has been checked in relation to the new act which has arisen.

The problem is, then, the checking of an action with the tendency to carry on still present. The inhibited action opens the door, so to speak, to all sorts of stimuli, and the new actions started up are hypothetical. In the mind of man they would be ideas, hypotheses. The problem itself, however, is antecedent to thinking and may be solved without thinking. Thinking is a certain way of solving problems. The importance of correct thinking is simply the importance of solving our problems.

2. The life in which the human community finds itself inevitably presents a set of problems. We get the warmth we need by clothes or by furnaces. If it is too hot, we get methods to cool the air. In order to meet these problems, we have to understand nature. The problem is, then, first of all a set of processes that have to be kept going, and it brings up whole sets of inhibitions that have to be resolved. Our understanding of nature is a way of solving these problems. If we find ourselves attacked by a new disease, if we find that we cannot get the right sort of food, we turn to science to find out what the

¹ §§ 1-17, except for § 7, taken from student notes

ground for it is, so that science is simply a part of the process of living.

3. Aristotle's logic is built up on the theory of the thing. From his standpoint the thing is something there. That is not the attitude of modern science. For Aristotle the tree, the lion, the tiger, had always been there from time immemorial. They had certain natures, and they continued to have them. Our science is of an evolutionary character not only in regard to cats, dogs, and men but also with reference to stellar bodies, and even with reference to the so-called elements. We try to show how things appear, arise. From Aristotle's standpoint the thing was there. The business was to find out its nature. Our interest is to find out how any particular thing comes to be, and for that we have a different type of logic.

4. Science always tries to state an organized system of relations, but it never states the character of the object in itself apart from its relations. Take a scientific statement of the solar system. Each solar body has a certain mass. You can think of the mass as something having inertia inhering in it, a certain force lying in it. There you have a body that has something that can be measured, but you could not possibly state scientifically what that inertia is. You cannot find mass in terms of its quantity because you cannot determine the density. You have to measure it by the amount of resistance offered, to get the relationship between that body and some other body. If you weigh the earth, you are determining what the deflections of the other planets are by the so-called attraction of the earth. You cannot deal with a body just by itself and find out what it is and so build up a system; you have to state it in terms of its relation to some system there. Now it is these necessary relations between bodies with which science is occupied. Where you get *A* and *B* and their relation in a single event, you have a passage of relations, and, if you can duplicate the event, you can duplicate the *A* and *B* which belong to that event. Science is always trying to get back to these processes.

5. History serves a community in the same way as the mem-

ory does the individual. A person has to bring up a certain portion of the past to determine what his present is, and in the same way the community wants to bring up the past so it can state the present situation and bring out what the actual issues themselves are. I think that is what history uniformly is. It is always prejudiced in one sense, that is, determined by the problem before the community.

So far as I see, our history is trying to restate the past so as to make our present situation intelligible. Greek and Roman histories are always written from the standpoint of interpreting an immediate situation in which the Greek and Roman communities found themselves—bringing those situations up to date, so to speak, so that present problems may be accurately defined. That is what the persons who write history are interested in doing.

You will find that tendency in all historians. It cannot be escaped because, after all, the only way the historian can present the facts is in terms of his own experience. You can show that he is not as artistic as others, or that his statement is not accurate, or that he fails to use certain material, but in the final statement you cannot criticize his interpretation. In actual literary history you are really getting the past so far as that enters into the present problems. And there is no possibility of getting a final history anyway in that sense. It is important, of course, to distinguish between the two phases of the writing of history, the interpretation from given data and the utilizing of the different social sciences. There you can reach certain definite results—not as definite as in the physical sciences, but, nevertheless, definite results. You can get events which succeed one another. But whenever you get to the point of introducing what situations existed in the past, you are stating your present, the present of the community, in terms of the past in so far as that past enters into the present problem. The historian is correct in so far as he states the past in its relation to the present problem.

6. The reaching of universal ways of acting that you can

depend upon, and the application of these ways to particular instances, represents the phase of thinking with which logic has primarily to do.

7. Logical analysis of the experimental method:

a) *The presence of a problem.*—A problem can be most generally described as the checking or inhibition of some more or less habitual form of conduct, way of thinking, or feeling. We meet an obstacle in overt action, or an exception to an accepted rule or manner of thought, or some object that calls out opposing emotions.

b) *The statement of the problem in terms of the conditions of its possible solution.*—We find ourselves tending to act or think or feel with reference to a situation in ways that are so opposed that they inhibit one another. The statement of just what it is in the situation that calls out these inhibiting reactions is what we call gathering the data or facts. The effort to formulate these leads us to find like situations in the present or the past, but the goal of the process is such a definition of the facts that we are aware of exactly what are the conditions which must be met to enable us to continue our action, or thought, or feeling, and such a statement is a statement of the problem in the form that invites solution.

c) *The formation of hypotheses, the getting of ideas.*—The hypothesis or idea is of some possible representation, restatement, or reconstruction of the situation, in which the data or facts will no longer inhibit action, thought, or feeling.

d) *The mental testing of the hypothesis.*—The real test is whether activity goes on or not. We are trying to continue an act that is stopped. If we find ourselves acting in accordance with a hypothesis, we feel it is the right one. It is this testing with which logic has most to do, especially through the relations of propositions.

e) *The experimental or observational test of the hypothesis.*—This amounts to constructing or finding an actual situation answering to the hypothesis or idea, and discovering whether action, thought, or feeling can continue unimpeded. For ex-

ample, a physician finds that the spread of an infectious disease invalidates his method of quarantine and therefore inhibits his use of it. He gathers the cases of the disease that so appear, and they constitute the conditions which any solution of his problem must meet. He gets the idea of other channels of infection, which is his hypothesis. He proceeds to act upon this hypothesis under conditions which are carefully controlled to see whether he can successfully continue fight against the disease. The scientific character of the method is evidently found in the careful exactness with which the problem is defined, the data gathered, the hypothesis formulated, and the experiment carried out, but these are merely the elaboration of the simple processes of everyday inference by which we meet our constantly recurring difficulties.

8. The method that is commonly opposed to the experimental method is that of deduction, and this is supposed to be exemplified most characteristically in mathematics. The term is unfortunate, for what is called "deduction" is involved in various stages of the experimental procedure, e.g., mathematical physics presents a field within which experimental method has achieved many of its most striking victories. The real distinction lies between the fields within which we are free to apply this elaborated method of human intelligence to the solution of our problems and those within which the problems are accepted as inevitable and insoluble, or those within which attempted solutions are regarded as dangerous, because they would bring with them the reorganization of situations, especially social situations, which the community is afraid to have touched.

In the elaboration of these situations in which problems are shown to be insoluble or to be problems whose solution must not be scientifically attempted, we use what we call "deduction." Indeed all formulations of problems are deductive, whether we undertake their solution or not, but as, in the cases of these two latter fields, we do not advance to attempted solutions, the method of approach seems to be entirely deductive.

9. What sort of procedure is this mental testing of a hy-

pothesis? It is putting together your past experiences and seeing what the result is. In the case of the mathematical problem concerning the sum of the angles of a triangle, you have past experience of angles without reference to your experience of triangles, and you put these together. You have to have hypotheses to start off with. The difference between that case and the problems of the empirical sciences would be that you could not carry out your testing of such problems simply in the fourth stage. You say, "My hypothesis is that the exterior angles are each equal to two interior opposite angles. Then, of course, the angles of a triangle are equal to two right angles." You draw lines parallel with the opposite sides of the triangle, and that is testing just as much as testing a hypothesis by observation of the heavens. The only difference lies with the point at which you do your testing. There are those who maintain you can carry on mathematical problems without any hypothesis: you simply have implications which lead to the result. I think you will find that every mathematical problem is a problem that has to have some sort of hypothesis for a solution, and that you test the hypothesis by deduction of the sort we have described.

Most scientific problems worked out by means of hypothesis and experimentation reveal the process of mind by which they were actually reached and not simply a demonstration at the end. The scientist presents all the data and asks other people to go through the experiment. Darwin's theory as to the origin of species may be followed out in detail—the situation in which his hypothesis appeared and the material that has come in to support it. But with mathematicians what takes place is not accounted for in the demonstration. If followed out, we would find the same procedure as in the so-called empirical or inductive sciences.

10. Syllogism is a way of determining what the result of a certain act will be if carried out. It is only a part of the whole process. The syllogism does not stand by itself but is a way of testing a possible response. Take the engineer building a skyscraper; he has a vast amount of deductive work to do concern-

ing the strains and stresses on the material put into the building. If the parts have such and such tensile strength they can stand so much weight. If they have that strength, then he has established his hypothesis that he can use them. His deductive process gives him the response that he can make use of certain material, since it will carry so much weight. Deduction is a way of determining what the consequence will be upon certain acts, and then on the basis of that determination you can test stone and concrete and steel as the engineer does and conclude that you can use this material. The process of thinking is not shut up inside of the syllogism.

You really construct your experiment by means of the syllogism, the "if-then" process. The "if-then" relation is the very form you give to your experiment. Take, for example, the experiment used in testing Einstein's theory of relativity. The paths of light which go by the sun bend, through the attraction of the sun, in the proportion that the doctrine of relativity calls for, or only by what would be called for by the Newtonian theory. The statement of carrying out that experiment will be in the form of such an inferential process as that "if . . . , then" This gives you the form of your experiment of determining how much the light is displaced. You get a case where you can test the two doctrines.

11. Science never gets hold of a force which answers to an effort on our own part. It does not discover anything like an arm stretched out from the sun pulling the earth toward it. It only finds the force that takes place, the acceleration and velocity that take place. Thus the term "cause" is a very ambiguous sort of a term. When we speak of science as trying to find the cause of changes, we are really trying to find out what the laws of change are; what the uniformities are in the changes themselves under certain given conditions.

12. Our experience is not simply an experience of color at this moment and color at the next moment; our experience is of something that is taking place. Hume overlooked the fact that there is such a thing as passage in experience and that

it is a real relation. If we simply set up things that just appear, the most we can say is that, given such a condition, something else happens; but we cannot say that there is any causal relation. We can set up all the conditions if we like, we can take a cross-section of the universe at one moment and a cross-section of the universe at another moment, but then the only thing we can say is that the world is this way at one instant and that way at another. There is no necessary relation. The question comes up when we inquire what basis we have for assuming that there is any necessary order in the universe, ordinarily stated in terms of the uniformity of nature. What I was pointing out is that we do have an actual experience of one moment as determining the other. We experience the dependence of the movement of the first part and the movement of the later part. It is that that really lies back of causation. Science now is trying to get back in this relation of *A* to *B* to a process or situation in which both *A* and *B* are part of one event. It may be a very elaborate process, such as a life-history, and we may want to find out how, for instance, digestion affects the health. What we try to find is the life-process of which both are a part. The same thing holds in working with the movement of bodies. There is a definite process going on in the movement of one body, and we want to state that the positions of the body at one moment and another moment are a part of the process going on. Natural law is not a mere connection of *A* and *B*, it is finding *A* and *B* as essential parts of some process going on.

13. We cannot follow out the path of the separate molecules, but we can get a statistical statement of the range of their paths taken as a whole, and on that basis we can get a statement in the form of the law as to what is taking place on an average with the average molecule. The assumption is that, if we could follow out the separate molecules, we would get an absolute statement of what is taking place. Our statistical statement is a statement of what is taking place in a mass of observations; when we cannot follow out each separate object, we assume that there is uniformity. We assume that there are laws which de-

termine the actual motion of the arm, the weight of the tossed penny. We must not get the impression that we have a coefficient of correlation representing law for part of a process, and mere chance on the other part.

14. What is probability? It is what you might expect to appear in a certain number of cases. In one way it is a sort of exclusion. Where there is absolute ignorance, you do not know what will happen; but, if you get a statement in terms of probability, you commence to reduce the extent of your ignorance just so much. You are really stating what is most likely to happen. If you have some sort of evidence, you have a basis for assuming that one thing will happen rather than another. It is really a determination of the way in which you can most rationally act under circumstances where there is a mixture of knowledge and ignorance. If you could know everything involved in throwing up a penny, you could determine just what will happen; but, as you do not, you simply make one guess that is as good as another. When you find through a series of trials that one side comes down just as much as the other, then you are justified.

15. All our reasoning attempts to get back to some process taking place. We assume there is regularity in everything that takes place. If we could get all the facts, we would be able to deduce certain results. In the field in which we are making our investigation, we could predict. Does that necessarily mean that nothing can happen in the world which could not be predicted? Supposing we have all the facts implied in the exact sciences. Suppose we get a complete mechanical statement of what is going on in the earth, would that carry with it also the assurance that nothing could happen at all that could not be predicted? Take such a simple affair as water. Supposing we knew all about the molecules involved in the atoms comprising water, would that state to us in advance the character of water, as water? We would be able to determine the positions of the atoms, but water is something more than H_2O . We obtain certain wholes as a result of various compositions which have char-

acters not given in the parts themselves. Another striking illustration is that we could not prophesy the different colors which appear in our sensuous experience from our knowledge of the colors appearing in the spectrum. Things emerge, and emerge in the mechanical order of things, which could not be predicted from what has happened before. The result has characters which are not necessarily given in the statement of the different parts in their relation to one another.

16. Most scientific laws are in the form of working hypotheses. You say, "If this is true, then such and such would result"; and you continue to use the hypothesis as long as you get those results. You use the hypothesis that works. You say, "If *A* is *B*, then *B* is *C*." You find that this hypothesis at least works, and if you have a better hypothesis you use it, but if not you continue to use the other one. And by "better" I mean a simpler one, if it fits in better with your conditions. I want to make that quite clear. When you have your problem and present a hypothesis that will solve it, then you say, "If such and such is true, the hypothesis must be true." If such and such does happen, then you have a hypothesis that will work, although it may not be proven absolutely. I want to point out that the hypothetical proposition is just that form in which you bring out the working hypothesis. What it does show is that you can use this hypothesis until you can get a better one. Science has gone on the basis of the law of parsimony, and it has been justified. On the whole, science in selecting the simplest theory has found it more successful. The law of parsimony is supported by the actual advance of science itself.

17. Are all propositions hypothetical? Can we say absolutely even that "this desk is here"? That proposition, too, is ultimately hypothetical; it could become a problem. If there is the sort of response we expect to have when we come up to it, then it is a desk—but there are further implications that always remain untested and which could become problematic. The problem is the stoppage of the action, and the solution is one

which allows the action which has been stopped to be completed.

18. Inasmuch as the physical object which is implied by the physical sciences includes the physiological organism of the observer, it is evident that the individual is not included in this world of physical objects. He stands outside and presents it. This is made possible by the social character of the self, through which the individual addresses and observes himself. He does this by assuming the role of another. The self that one addresses and observes may be the social individual perceived as other individuals are perceived, and in an environment of objects which have the same qualities of immediate experience as those which belong to other social individuals. In this case the individual observed is identified with the physiological self, especially its vocal gestures, tones of voice, facial expressions, attitudes of body, and all that calls out social response in others. The distinction between the self as speaker and the self as an individual addressed is the distinction between the self which is doing something and the self which is the result of past conduct. This former self is at the threshold of action and has as its function the statement and reordering of the world as past and present in the interest of the conduct which is in hand. Out of this conduct grows a changed situation in which the action of the individual has its place. He is creative. This is evident in the social world. It would not be what it is without his conduct. The change may be slight, but it is unquestioned. The same is true in so far as his conduct is that of invention and discovery. A new world in so far results from his creation. It is also true that for the social consciousness of the community the past and the present world is reconstructed by the action of the individuals. The world of history has been changed as often as new conduct has called for a different order of action. The assumption remains, however, that the new past which is discovered, the new structure of the physical and biological world, has been in existence back of the earlier doctrine. If we regard the object

of knowledge as the organization of means for the accomplishment of our undertakings, we are in the position of affirming that the real order of nature and the real succession of events can never be known, as every essential change in the order of conduct will bring with it a somewhat different ordering of the mechanism of the world of things and society. The past can never remain entirely the same, and the order of the physical universe cannot remain the same. The implication of this attitude toward the object of knowledge is that there is a universe which has an existence as an object of possible knowledge but that this knowledge is unattainable.

If, on the other hand, we assume that the object of knowledge is the experience of the thing which has been so brought under control that conduct has become possible where it has been thwarted, the formulation of the mechanism of things and of the order of history will be true in so far as it is experimentally shown to work in conduct. It will, of course, be further true that through considerable periods the formulation of things and history will remain substantially unchanged, as the condition of successful conduct. Just in so far as the order of things is not called into question by the specific problems engaging thought, their order will be unquestioned and will stand as true in the solution of the actual difficulties that face us. As none of the problems that engage our attention is of the universe as a whole, there will always be an undisputed structure of the world, within which we pursue the specific truths which our research is after. This structure will for the time being always be a condition of the truth sought, though later problems may bring parts of this undisputed structure into debate and take it out of the realm of accepted fact and theory.

19. The outstanding fact in all the undertakings of knowledge in this century and the last is what is called the scientific method. There is no difficulty in showing that, whether we call it the inductive or the experimental method, it is implicated in all intelligent conduct and that it has been involved in knowing the world at all times. It can be found in the absurdest con-

clusions of children and primitive communities. That the inferences are improperly drawn does but disguise the fact that these minds were with varying degrees of carefulness or inexactness trying to explain something, to solve some problem, by some idea or hypothesis, testing the idea by its fitting into their experience so that it can become a part of this world. A child's explanation of the conduct of others and the savage's appeal to magic are uncritical uses of a method which requires only analysis and recognition of the implications of its technique to become scientific. What has therefore characterized this recent period is the critical interest in the technique and steadily growing awareness that it is being used under all conditions and needs only the control which reflection upon it reveals. The importance of scientific method in our period which has led to its elaboration is not found in its novelty but in the successful invasion of this elaborated method into fields where it was not previously employed.

VI

HISTORY AND THE EXPERIMENTAL METHOD

HISTORY has enrolled itself among the sciences that make use of the experimental or observational method, i.e., the historian professes to be ready to approach the solution of any problems that appear within his field in terms of scientific method. If he finds that some of his material belongs to the fields where the scientific method is not welcomed, he is likely to undertake to free his own problem of the reconstruction of past events from these other issues and attempt to keep within his own field a clean scientific conscience. That this has proved again and again an impossible program is abundantly shown in fields of higher criticism and evolution. In fact, it has been the history of dogmas that has brought more than one metaphysical problem into the range of scientific investigation. The scientific treatment of religious institutions, beliefs, and experiences has arisen in each case out of the history of these subjects. Given an orderly statement of the situations out of which these have arisen, it is impossible to avoid the hypothesis of the causal relation of these conditions to the appearance of the institutions and beliefs, and the testing of this hypothesis is found in the observation of the changes which it undergoes in the presence of like conditions.

There is one question which I should like to broach upon which scientific method in history has a direct bearing. Does the import or significance of the results of historical investigation and consequent reconstruction belong to the past where these events lie, or is it to be found in the present and future? Otherwise stated, do we know the past through the present, and the future in so far as the test of our hypotheses depends upon future observation and discovery, or is the knowledge we are gaining knowledge of the present and future through the

past? A present fossil implies a past animal, a present document a past author. The knowledge of either waits upon future investigation and observation, perhaps even upon experiment. History as an observational science can get at its past only through the present and future. But scientific investigation does not end in its data; it begins with it. The outcome of science is a theory or working hypothesis, not so-called facts. It is not the recovery of the dream we seek but the interpretation thereof. Is the serious interest in history, which is not the meanest of the attainments of an educated mind, an interest that centers in the past, in the present, or in the future? Have we learned to understand the past through the present, or are we learning to understand the present and future through the past?

The first comment that will be made upon this question is, Why this disjunction? Why not both? Certainly history provides the candle to light our feet as we advance, but, on the other hand, our very advance may be into a fuller, richer, and more significant past, where we may dwell contentedly, using the present only as the soil within which may be found the data for its reconstruction, and the vantage point for its interpretation and romantic enjoyment, and the field of interesting controversies with rival historians.

Much have I travelled in the realms of gold,
And many goodly states and kingdoms seen;
Round many western islands have I been
Which bards in fealty to Apollo hold

Certainly the historical scholar and those who are privileged to see the resplendent past through the medium of trained vision and sympathetic imagination are not disjunctively bound either to the strategic use of its treasures in fighting society's advancing campaigns or to an irrevocable domicile in its pictured realms. Or shall we say of the historically minded, *vestigia nulla retrorsum*? The answer is in the negative. Not only do we find the historically minded dwelling comfortably on both horns of the spurious dilemma, but the forward impulse gathers

momentum from the concreting past, while its very furniture, tapestries, and personae are created in the factories of ongoing experience. The histories that have most fastened upon men's minds have been political and cultural propaganda, and every great social movement has flashed back its light to discover a new past.

But the question I have asked is somewhat more hidden and technical than that which has just been answered. Is the actual object of knowledge, the significant content which historical research reveals, the past object as implied in the present, or is it a newly discovered present which can only be known and interpreted in the past which it involves? My own answer, which I do not expect to find sympathetically received, is the latter, still I would like to present it.

The answer turns, as I have indicated, more or less upon the identification of knowledge with scientific research. If knowledge is the mere presence of an object in experience, if these walls and windows, these chairs and lights, and the people in the room, are, by grace of their being perceptually related to us, objects of our knowledge, then the person whom you discover to have written the hitherto anonymous document is, where he was and when he was, the object of your knowledge. You have simply by means of scientific research extended your specious present so that this formerly unrecognizable individual has been drawn out of the shadows, and, in this novel temporal perspective, he becomes one more figure in the world. His being there in your perspective is your knowledge of him. This definition of knowledge, this identification of the object of knowledge with the so-called percept, whether a percept by virtue of the eye or the imagination, in company with various other pragmatists I reject—and for reasons with which I will not burden you, though I will point out that the rejection sweeps out a vast amount of philosophic ruffraff known as epistemology, and relieves one of the hopeless task of bridge-building from a world of one's states of consciousness to an outside world that can never be reached.

Knowledge, I conceive, is the discovery through the implication of things and events of some thing or things which enable us to carry on where a problem had held us up. It is the fact that we can carry on that guarantees our knowledge.

I should like to adduce in favor of this view that it is the only doctrine that justifies the feeling of assurance in knowledge. We cannot find justification in a permanent and irrefragable past. Each generation and often different minds within a generation have discovered different pasts. And these pasts are not only different because they have become more spacious and richer in detail. They have become essentially different in their fundamental significance. We speak of the past as final and irrevocable. There is nothing that is less so, if we take it as the pictured extension which each generation has spread behind itself. One past displaces and abrogates another as inexorably as the rising generation buries the old. How many different Caesars have crossed the Rubicon since 1800? But, you say, there must be identical events in each, else the new past could not displace the old and occupy its field. Yes, there are coincidences of events that are relatively permanent, and which make possible translation from one historic account to another. But coincidences of events are not the objects of our knowledge. Through centuries the Mesopotamian magicians recorded the dim eclipses that disastrous twilight shed on half the nations and, with fear of change, perplexed their monarchs. The clever Greeks took over their Great Saros but saw planetary bodies interposed through the revolution of heavenly spheres about the central stable earth. Copernicus, more successful than his Greek prototype Aristarchus, with the hand of Joshua stayed the sun in the heavens and dispatched the earth with her satellite in an orbit about the sun to cast the stellar shadows that are no longer ominous; and now it is a matter of indifference to the relativist whether earth or sun revolve to bring about these eclipses. The Mesopotamian recognized fantastic gods in hostile chase; the Greek, incorruptible spheres within spheres. Since the Renaissance the Western world has known

inert masses moving through an indifferent space according to Newtonian laws. I am quite incompetent to paraphrase stellar history in an Einsteinian world, nor has eye seen or ear heard what new heavens and new earth will in another fifty or a hundred years displace ours in the history that that generation will write of its habitat. In all the histories there were certain coincidences that ran through all and make a thread on which all may be strung in the history of histories. But, whatever else they may be, these coincidences are but abstractions from the objects of our knowledge. They are not the past that interprets our present.

No scientist secure in his experimental method would base that security upon the agreement of its results with the structure of any changeless past that is within his ken. Indeed, if the past were fixed, there could be no more progress in knowledge, for every discovery refashions that past *pari passu* with the present.

Otherwise stated, the past is a working hypothesis that has validity in the present within which it works but has no other validity. However, the question of validity does not arise at all, except in the presence of some problem. It is only then that we undertake to discover the solution to the problem and assure ourselves of its validity by experiment or observation in some crucial instance if possible. And then we say that we know. Whatever fits into the world that is there, so that we act with reference to it as we do with reference to the world that is there, so far as experience is concerned, is there also, until in conduct we find that it is not there; and then we have a problem on our hands and have to find out what is there—a problem of inference, of implication, of knowledge.

That sort of knowledge belongs to the present and the future that tests the hypothetical present. It does not belong to the past, that is, it does not find its significance in the past. Here again we have to distinguish between significance for knowledge and the significance that belongs, for example, to a drama. There is significance in President Wilson's fight for the League

of Nations that is a timeless significance like that of an Ibsen tragedy. The significance of the planetesimal hypothesis does not lie in the past aeons in which we assume its operation but in our present use of it in stating a going universe. With new data it will be modified or laid aside. At present it is presumably truer than any other hypothesis. The past that is there for us, as the present is there, stands on the same basis as the world about us that is there. The past that has to be found out, to be inferred, is appealing for its significance to our present undertaking of interpreting our world, so that it will be intelligible for present conduct and estimation.

The long and short of it is that the only reality of the past open to our reflective research is the implication of the present, that the only reason for research into the past is the present problem of understanding a problematic world, and the only test of the truth of what we have discovered is our ability to so state the past that we can continue the conduct whose inhibition has set the problem to us

Now this assumption of the pragmatist that the individual only thinks in order that he may continue an interrupted action, that the criterion of the correctness of his thinking is found in his ability to carry on, and that the significant goal of his thinking or research is found not in the ordered presentation of the subject matter of his research but in the uses to which it may be put, is very offensive to many people, and, I am afraid, particularly so to the historian. Pragmatism is regarded as a pseudo-philosophic formulation of that most obnoxious American trait, the worship of success; as the endowment of the four-flusher with a faked philosophic passport; the contemptuous swagger of a glib and restless upstart in the company of the mighty but reverent spirits worshipping at the shrine of subsistent entities and timeless truth; a blackleg pacemaker introduced into the leisurely workshop of the spirit to speed up the processes of thinking *sub specie aeternitatis*; a Ford efficiency engineer bent on the mass production of philosophical tin lizzies. These disparagements are all boomerangs, but I will not con-

stitute this a clinic in which to demonstrate the contusions which those who have hurled them have suffered, but will address myself to the single charge that this philosophy would dispossess men of the leisured contemplation and enjoyment of the past.

First of all, pragmatism holds no brief against aesthetic experience. It is an activity to be acknowledged like all other human activities, and like these it faces its own problems, those of appreciation, and solves them by reflection. When by reflection have been reconstructed the landscapes of that mighty world of eye and ear, or of the confused pageants of the past, the spirit enters into its enjoyment with the sense

Of something far more deeply interfused,
Whose dwelling is the light of setting suns,
And the round ocean and the living air,
And the blue sky, and in the mind of man.

But beside the literary historian, whose works are as precious as are those of the great dramatists and architects, there is the dry-as-dust, or, as he is called today, the scientific, historian. His criterion may not be aesthetic, at least not until he has satisfied his scientific conscience. His task is the scrupulous determination of facts, the formation of hypotheses and the testing of them by the data within the reach of his investigation. But facts are not there to be picked up. They have to be dissected out, and data are the most difficult of abstractions in any field. More particularly, their very form is dependent upon the problem within which they lie. There is, of course, a vast amount of machinery involved in the storing, cataloguing and analyzing of unbound material, pertinent and impertinent, but the working of this machinery does not constitute the work of the historian. It is but his apparatus.

It is, after all, in the problem that he finds the definition of his data, and in its solution the test of his sufficiency. Have those problems any other residence than in the need to better comprehend the society of which we are a part, and is the comprehension of that society anything but the considerate effort

to face conduct in that society intelligently? I do not think so. I think we overlook the intricate organization of the republic of letters to which we belong. A man picks up a problem and calls it his, with perhaps slight appreciation that he is taking up a task which arises out of the conflict of insistent social processes, for the solution of which he has volunteered. He makes it his own, but he did not originate it. The academic attitude of creating problems for Doctor's theses is not favorable to the just realization of what problems are when they are genuine. And then the man who has taken up the assignment naturally magnifies his office. He looks at the results of his labors *sub specie aeternitatis* because he does not see just what part of the whole job his has been. It requires the detached attitude of a later day to see the fruit of his efforts combined with that of many others in a shift of the community's attitude toward the incompetency of its institutions.

Now the past that is thus constituted is a perspective, and what will be seen in that perspective, and what will be the relations between its elements, depends upon the point of reference. If we wish to regard it metaphysically, there are an infinite number of possible perspectives, each of which will give a different definition to the parts and reveal different relations between them. Which of these particular perspectives is the right one, metaphysically? There is no answer to the question, except a mystical engulfing of all the perspectives and ourselves with them in the Absolute. But the Absolute answers no queries. It provides emotional aspirations at the price of intellectual immolation.

This particular perspective is there, thanks to the particular problem of social reconstruction that is going on, and with the change in the situation all of its features will have suffered a transformation, and the landscape will melt into other contours as they do for the eye of him who ascends a mountain. Its significance is eternally fixed in the eternally passing and creative present. The most that we can do is to find the constants of coincident events, in themselves bloodless abstractions, by

which to translate from one consentient set to another, to use the jargon of the relativist.

I do not think that this standpoint abrogates from the potency or impressiveness of the past, or relaxes the sinews of the historian; unless it be from the standpoint of the lotus-eater for whom

All things are taken from us and become portions and parcels of the
dreadful past

Looking over wasted lands,

Blight and famine, plague and earthquake, roaring deeps and fiery
sands,

Clanging fights and flaming towns, and sinking ships and praying hands

The past is impressive as it emerges into that form and structure which gives solidity and significance to the hasting and evanescent present.

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PART II
PERCEPTUAL AND MANIPULATORY PHASES
OF THE ACT

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VII

PERSPECTIVE THEORY OF PERCEPTION

IT IS only in a perceptual world that errors of perception can take place. The error is recognized by the failure of the percept in question to take its place in that world. The error is recognized when the continued experience does not result in a manner which makes possible the completion of the act. The explanation may lie in the environment or in the organism, e.g., in the case of the stick bent in the water the error lies in the environment, while in the case of alcoholic hallucinations it lies in the organism.

The reality of the percept lies in the later experience. This is not a copy of that which is present in the distance experience which initiates the act; rather the continued identity of this distant experience in the passage or movement that carries out the act (especially its identity or identity in certain detail with the experience of the manipulatory area) is the basis for the copy doctrine.

There is, furthermore, the relation of the anticipated experience of contact or of the other experiences of the manipulatory area to that which is actually aroused, a relation which is in a sense a relation of an image to the reality. There is a copy relation of the hardness of what one sees to the hardness which is felt. The expression is, however, largely a misnomer, for what is present as a rule is rather the readiness to grasp than the image of the resistance of that which will be grasped.

The percept is there as a promise. It is true when it fulfils its promise. In the field of manipulation there is a group of percepts which are both promises and fulfilments.

The statement that perception takes place through the nervous system is ambiguous. The nervous system is itself a percept. The only intelligible significance that can be given to the

statement is that the particles in motion in the seen object are the reality of that which appears in vision. This is a reality which is that of contact, or of the manipulatory area. It is, however, spatiotemporally distant from the organism. In the scientific account we attempt to approach a level of nature in which the organism and the object seen are at an instant, and are recognized in their reality, i.e., their contact character, and those other characters which they maintain unchanged in the manipulatory area. It is the area of congruence, of substitution and measurement.

The fundamentals of perception, then, are the spatiotemporal distances of objects lying outside the manipulatory area and the readiness in the organism to act toward them as they will be if they come within the manipulatory area. This readiness expresses itself in the selection or cutting-out of those characters in the spatiotemporally distant object which innervate the processes of manipulation when the spatiotemporal distance has been overcome. We see the objects as we will handle them. The spatiotemporal distance is in so far canceled in perception. The truth of the perception lies in the agreement of the initiated process of handling with the actual process when the separating distance has been actually covered.

The implication is of a world contemporaneous with the manipulatory area and, as we approach the sought simplicities of measurement, of a world at an instant. As we carry objects from the present manipulatory area to that at a distance, we anticipate congruence of the objects, such as a foot rule with the object which is seen as of that length.

For perception, then, there is a contemporaneously existing world at a distance in which we are ready to act in certain fashions already initiated in the organism. It is actually existent in the fashion to arouse these beginnings of manipulatory processes. This world is not known; it is there in perception. The moment that the question arises whether we will complete the processes initiated, then we refer to that which we perceive as that of which we are conscious, and we seek to test what are

now the implications of the distance experience. We are only "conscious of" that in the perceptual world which suggests confirmation, direct or indirect, in fulfilled manipulation. For the time being it loses its full status in the environment, awaiting the test. Its unquestioned reality lies in characters which reassume their spatiotemporal character and their selection by the organism. The dagger before Macbeth is not there until he grasps it. If Macbeth could have isolated the selected shadowy elements of the visual environment and the imagery, they would have been there, but the dagger's reality, which his hand sought to grasp, lay in the future. He was conscious of what implicated that futurity.

The reality of what we see is what we can handle—it is this which is congruous, it is this which is contemporaneous, it is this which may be conceived of as existing at an instant for the purposes of exact measurement, it is this which may in imagination be indefinitely subdivided without reaching a contradiction, it is this which existing at a distance has the same character as at hand—but the control of it in the field of manipulation is normally visual, though the reality of the seen is the felt. If the distance value, such as the color, is taken as contemporaneous, as distinct from the manipulatory value, we are likely to speak of it as that which we are conscious of; and, if we take the attitude of grasping the object, apart from the conduct which the manipulatory value has in direct immediate experience, it appears as that which we are conscious of in the organism. This is especially true in the determination of what an object is when we question what its reality is: e.g., in the approach to an object in a dimly lighted room, we are conscious of the adjustments of the organism to the bulk or the sharp corners of an object.

Perceptual experience is that in which we control our conduct with reference to spatiotemporally distant stimulation by the promise of the contact experience, by what Whitehead calls the conveyance of the contact quality by the distance characters. If this takes place directly, consciousness is not involved. In

the case of hesitancy the readiness to respond contactually to the characters in the distant object is emphasized in the selection of those characters in the object which are responsible for these incipient responses, and consciousness arises—consciousness of the promise of the object. In this situation the experience belongs to the perspective of the individual in question, for the emphasis is upon what the attitude of the organism is under these conditions. The perspective of the individual is brought into relief, only to be broken down, i.e., what belongs to the environment of the individual—the fulfilment of the promise out there existing contemporaneously with the manipulatory area—exists in the so-called consciousness of the individual. Being in doubt whether the object is really there in its promise, the colored visual form is left hanging in the experience of an individual cut off from his environment. The experience is contemporaneous with the organism in its manipulatory area, not contemporaneous with the area out there, though in perception that area is contemporaneous with the manipulatory area. We date the color experience from the organism, not from the questionable object.

This reference to the organism in the case of sensuous qualities of objects, and to the organism as a self in the case of meanings in the presence of a problem in physical and social conduct, indicates the field of psychology. It is a study of the characters of spatiotemporally distant objects which are divorced for one reason or another from those objects and are considered in their relation to the individual as a self-organism. The consideration has its functional goal in bringing these characters into relation with the environment. It takes place within a world of perceptual objects which are not questioned, and which provides the test of the solution of the problem that is gained. It is only a portion of the perspective that is broken down. And as it is only a portion of the objects that become problematic, so there is there only a portion of the experience of the self that is charged with these contents that are divorced

from their objects. The contents so charged constitute the so-called field of consciousness.

In unreflective conduct the perspective is not divided between the organism and its environment. The organism is present as a point of reference only. Those portions of the organism to which it reacts are in reality parts of the environment. They are unreflectively there with their peculiar characters. It is within such an unquestioned perceptual world that reflective experience lies. It is the world that is there in independence of the self, though the reference to the self as point of reference is always implied. That is, the distinction between here and there, between now and then, which has meaning only with reference to the organism, is involved in all conduct however unreflective. We live, then, in a world that is independent of us, except in so far as we determine its perspective, but within this world lies a field of so-called consciousness in which appear the character and meanings of things that are spatiotemporally distant and have been detached from what we consider the reality of the thing, by the problematic form of conduct. These characters and meanings the human social individual refers to a self because its social conduct has enabled the organism to react to itself as to another, because it is only the organism's part in the experience that lies within its control.

Primarily the content of the self, from the standpoint of psychology, is the response which the object makes to the conduct of the organism with reference to it. The hardness of the wood which answers to one's pressure is in the self as content, just as it is the attitude of the other in social conduct as called out by one's own action that constitutes something in the mind of the self, but it is this content as controlling the action of the organism. Our statement of it is that we realize the hardness of the object and do not run our heads against it. By acting as the object will act, or by beginning such an action, we direct the deferred response to the object. These attitudes as in advance of the actual experience of the object are in the self and only

hypothetically in the object. They belong to a world that is coming into being and do not lodge in the world that is there; and the central nervous system is in the world that is there. By inference we refer this conduct to the central nervous system, but the sense of pressure that we anticipate in the wood does not belong as yet to the wood that is there or to the central nervous system that is there. While we can so refer it, we do not feel it in the central nervous system, which we can imaginatively place upon an operating table before us. Our consciousness is of the pressure that the wood will exercise. The wood that is there does not as yet exercise that pressure. Reflective consciousness is always temporally ahead of the world, including the central nervous system.

When we state that we are conscious of a physical object, we do not refer to the distance characters as contents but to the physical reality of the object which if realized would be in contact experience, but which on account of the problematic nature of the conduct in question is divorced from the distance characters. These distance characters are there, and, whatever they prove to be, they belong to the world of the cyclopean eye, which is, in the passage of nature, dated from the perspective of which that cyclopean eye is the point of reference. The reality to which we refer when we say that we are conscious of the object has a double temporal reference. It refers to the completion of the act which the perception initiates and lies therefore ahead of the experience given in the world of the cyclopean eye, but it has an element which dates from the experiences of the specious present and yet, because of the separation from this world, does not belong to it. This element is the response of pressure which the object will give if one brings it within the manipulatory area. That which constitutes the reality of the object is not the pressure of the organism in answer to the pressure of the object, which is at the same time initiated in the organism, but the pressure of the object which calls out this beginning of the contact response.

That this pressure of the object at a distance is brought into

experience is due to the co-operative character of our physical activity, both in maintaining our physical positions in motion and at rest and in the manipulation of the objects that we handle. The pressure of the foot calls for the corresponding pressure of the ground. It is only in a situation within which action and reaction between the organism and manipulated things constitutes a moving system that we successfully control implements or any physical things. In our abstracted view of the physical world about us, we overlook the co-operation which we are continually looking for, in rest and movement on the slight foundation for our feet, in the mutual leverage of the organism and the objects it handles, and in general in the firmness, elasticity, and effective occupation of space by physical things that give to us the opportunity for our reactions. The physical object must literally do as much as we do if we do anything. This dependence of the human animal upon the co-operative response of weight and mass and elasticity appears most vividly in the tentative appealing conduct of little children in getting and maintaining their balance and in learning to manipulate what they grasp after. It is still commemoratively present in the social attitude of primitive man toward his habitat and especially toward his tools and weapons. It flowers out in what we term "magic."

The necessary condition of this physical but co-operative "other" getting into experience, so that the inside of things, their efficacy and force, is an actual part of the world, is that the individual in a premonitory fashion should take the attitude of acting as the physical thing will act, in getting the proper adjustment for his own ultimate response. I do not mean that the presence of this co-operative physical other is necessary to a successful adjustment to a limited physical environment. There is a very wide field of physical adjustment, such as that acquired in learning to ride a bicycle, which can be won without the inner efficacy of the things that co-operate with us in our conduct appearing as isolable elements in experience. Presumably this latter is the type of adjustment which is acquired by

all animals except man. It is only man who has entered into a social relation with his environment, and then has abstracted and generalized it into a physical theory. What is essential to this social relation to the environment is not that the physical thing is endowed with a personality, although in the experience of little children and primitive man there is an approach to this. The essential thing is that the individual, in preparing to grasp the distant object, himself takes the attitude of resisting his own effort in grasping, and that the attained preparation for the manipulation is the result of this co-operation or conversation of attitudes. The mechanism for it presumably arises out of the interplay of different parts of the body against one another in adjusted stresses, primarily of the hands. If this were elaborated into its implied details, it amounts to a social hypothesis of what will happen when one comes into manipulative contact with the distant thing. I am prepared to seize the object, and then in the role of the thing I resist this grasp, pushing, we will say, the protuberances of the thing into the hand and arousing more effort in the hand by the leverage which the extended portion of the object will exercise, and through these responses of the thing I reach not only the final attitude of prepared manipulation but also a physical object with an inside and an inherent nature. About this fundamental core can gather the other things that an object can do to us, its efficacies, its active properties.

This does not place the content of the object in the psychical experience of the individual. The efficacies of things lie in a future which is already there in the so-called specious present. The hypothetical social attitude is psychical (as a premonition of what is going to happen) until it works, when in so far as it works it is the nature of the thing within the perspective of the individual, or, rather, of the group in interaction with which his self has arisen. While this perspective is determined by the here and there and the now and then of the organism, this here and there and now and then is only a point of reference in space-time, with reference to which a cogredient set is determined, and

the organism lies within the perspective in perception. It is, of course, absurd to place the perspective inside of the organism.

Except when one holds what one looks at, the reality of the perceptual object lies in future experience, but in unquestioned perceptual experience we abstract space from space-time, reducing the span of the specious present to enable us to secure the uniformities of nature and carry out measurements, moving toward the fiction of the world at an instant. This process brings the future reality of the perception into this abstracted present of a time also abstracted from space-time, for the unquestioned reality—the contact character of the percept—endures, while the distance characters of the object change with every change of the distance of the object from the individual. The very process of getting a space and a time abstracted from space-time abstracts the enduring content of the object from the passage of nature for perception, removing thus the futurity of the reality of the percept. When, however, the percept becomes problematic, futurity is returned to the percept. The reference of any hypothetical reality of the percept to the self is what is termed “psychical.”

So-called abstraction from passage takes place in an experience which in some respect does not exhibit that passage. Any character may serve for this, but the contact values of resistant spatial experience are most favorable. Modern science has been successful in finding hypothetical physical particles which preserve their enduring characters of energy spatially determined and whose motions are the conditions of the other characters of perceived objects, beside that of the effective occupation of space. We can thus approach the limit of the world at an instant, in so far as these physical particles endure. The physical occupation of space is that of the contact reality of the percept, and the abstraction from passage leaves the object with this character wherever and whenever it may be, i.e., it extends the structure of the manipulatory area throughout spatiotemporal experience. We see things existing in the form in which they might imaginatively be handled. The moment in

which we are in doubt about the reality of that which is perceived, the character of that reality is postponed until assurance can be reached in the passage of experience. Its imaginary hypothetical character resides as a present experience in the individual who is constructing the hypothesis.

Characters and the things in which they are embodied endure only in perspectives. This is most strikingly evident in the characters of motion and rest. Whatever is at rest in one consentient set is in motion in another. But this is also true of other characters. There is no sensuous character that is absolutely changeless. We recognize that even mass changes with motion. The general statement for this is found in the resolution of all the physical characters of things into energy, which in every element of a system is constantly varying. Nor can we find in the laws of nature as they appear in experience any absolute endurance. All the enduring relations have been subject to revision. There remain the logical constants and the deductions from logical implications. To the same category belong the so-called universals or concepts. They are the elements and structure of a universe of discourse. In so far as in social conduct with others and with ourselves we indicate the characters that endure in the perspective of the group to which we belong and out of which we arise, we are indicating that which relative to our conduct is unchanged, to which, in other words, passage is irrelevant. A metaphysics which lifts these logical elements out of their experiential habitat and endows them with a subsistential being overlooks the fact that the irrelevance to passage is strictly relative to the situation in conduct within which the reflection arises; that while we can find in different situations a method of conversation and so of thought which proves irrelevant to the differences in the situations, and so provides a method of translation from one perspective to another, this irrelevance belongs only to a wider character which the problem in reflection assumes and never transcends the social conduct within which the method arises. To talk about talking and think about thinking may be irrelevant to what we are talking and thinking

about, but it does not give the thought an object which is independent of the process within which the outer or inner conversation arises. The existence in the specious present, and in the approach to the world at an instant, of the reality of the percept is an expression, then, of the relatively enduring nature of the contact values of the percept, which being then irrelevant to passage belong to the specious present, though the act which will bring them into experience involves the future. Passage can be reinstated even here by the recognition of the continual recurrence of a certain pattern of experiential value. In this situation there is no separation of the organism and environment. The whole field is without analysis perceptual, including the organism itself.

When the beginnings of different contact reactions to the same distant object arise in the organism, and thus inhibit one another and the act within which they lie, these contact values of the object become hypothetical, lie in the future, and because of their relation to the beginnings of response in the organism are referred to the organism—in a word, become psychical. These, however, lie within a perceptual field which is not questioned, and the organism as a whole still lies in the perceptual field. The relation between the physical and the psychical is that between this unanalyzed field which is relatively irrelevant to passage and the hypothetical contents of the questionable objects, which await action involving passage to reach full reality. We seize upon the enduring element in the perception in the abstraction of the spatial and temporal characters of passage when we approach the world at an instant for the purposes of simplification and measurement, and this element is that of the contact experience in the manipulatory area. The future contact value of the distant perception as enduring and so abstracted from passage will be that of the immediate contact reality. The world stretches spatially away from us as a continuation of the manipulatory area, lying in the specious present and approaching as nearly to the world at an instant as the requirements of our simplification dictate. It is impor-

tant to recognize that, however serious and wide spread is the problem which presents itself in the perceptual world, there always remains a texture of this enduring so-called matter or energy, at least in the form of scientific objects, whose structure is the basis and condition of our solution of the problem. The ideal of this texture is the distribution of matter or energy at an instant. In contrast with this appear the anticipated contact experiences which will result from conduct in the way of testing the hypotheses upon which we act. In the shadowy outlines of a dimly lighted room the question arises whether the bulk lying ahead is a table or a chair. The solid floor and perhaps the walls are there at the instant enduring and abstracted from the field of passage. The actual arrangement of furniture belongs to the future. It is true that, whatever arrangement appears upon investigation, it must fit into the structure of the world at an instant as it now lies in the experience, and as such will be also a part of the world at an instant, but there is a perspective (that of the individual in question) in which the actual arrangement belongs not to that instant of his problematic attitude but to a future instant. It is only at that future instant that the actual arrangement can be referred to the world at the former instant, and then only from the standpoint of the enduring character of the structure of the world.

It is the doctrine of this paper that perspectives have objective existence. The obverse of this proposition is that the perspective is not subjective. In other words, there is always a perceptual world, that is itself a perspective, within which the subjective arises. The logical distinction between the subjective and objective lies within the perspective. The subjective is that experience in the individual which takes the place of the object when the reality of the object, at least in some respects, lies in an uncertain future. If one used, for example, one's readiness to jump across a ditch as a rough means of estimating its breadth in place of the tape, that attitude of the individual would be subjective, not because it belongs to the individual simply but because one substitutes tentatively an attitude belonging to the

individual for an existent objective character. What belongs to the individual has the same objective reality as that which belongs to his world. It is simply there. The fact that what belongs to him is largely accessible only to him, while his world is also accessible to others who exist in his social perspective, does not render the experiences of his organism subjective. They become such only when they become surrogates for an as yet unattained reality in determining his conduct. The affective side of experience is predominantly subjective because the attitudes of which the affection is a part so largely determine our conduct in the place of the actual objective characters which are responsible for them. Whenever we do a thing just because we want to, we are confessedly subjective in our attitude. Imagery is largely subjective because we depend upon our responses to imagery of that which is distant in space-time to determine how we would act with reference to it. Ideas are pre-eminently subjective because they are the structure of the symbols of things, and their meanings rest upon our responses by which we formulate our hypothetical plans of action. The relationship, then, between the individual and his world is a condition for the appearance of the relation between the objective and subjective, but it is not coincident with it. It does not exist, for example, in the perspectives of animals other than man, or in a considerable part of our own experience.

The first question that suggests itself with reference to the perspective is how does it appear as such in experience? The perspective is the world in its relationship to the individual and the individual in his relationship to the world. The most unambiguous instance of the perspective is the biological form and its environment or habitat. But while each implies the other, the relations between the two which are emphasized differ as we consider the dependence of the form on the environment or the dependence of the environment upon the form. We generally state the dependence of the form upon its environment in causal terms, while we state the dependence of the environment upon the form in logical terms. Thus Darwinian evolution has

presented the environment as selecting the variants that survive under its changing conditions, while the selection of the environment, except in migrations and the seasonal spacing of the life-period of the form, has been regarded as of negligible importance. On the other hand, the dependence of the environment upon the form has been stated in terms of the meanings which appear owing to the life-processes of the forms and the new objects in which these meanings inhere. Thus the environment is defined in terms of objects which are foods and in their spatiotemporal and physiological accessibility to the form; in terms of objects which are favorable or unfavorable because of their temperatures, their humidities, their protections from and exposures to dangers, and the like. It is still possible to reverse these points of view. If we conceive of life in its predominantly anabolic or vegetable and its predominantly catabolic or animal phases as a whole within which a vast differentiation of different functions has taken place inside a biochemical process that has always maintained its unity, then the causative selection of the surface of the sea, or of its bottom near the shore, of soils, climates, and geographical localities, may be profitably assigned to the differentiating life-process, and it is interesting to define the organic structure of the living form as logical functions of the solar energy, the physicochemical complexes and their distribution. In the most complex living organism, human society, this reversal of standpoints is the characteristic expression of its so-called intelligence. Human society selects its habitat geographically or may determine the temperatures and humidities that surround the surface of the human animal. It actually determines its soils and their growths and the animal life that these maintain, and finally it may select and determine its own variants. On the other hand, the success of society in harnessing the powers of nature lies in the mechanical view of the world, which enables men to regard any physiological process, or any technological undertaking, as a logical function of the physical and chemical processes that are going on in the environment of the society. The mutual

causal and logical determinations are essential to the perspective. The relation of these two forms of determination follows from the character of endurance and its relationship to passage.

Endurance does not exclude passage. Repetition of a pattern, in so far as the pattern is then irrelevant to passage, expresses endurance as adequately as an entity whose nature lies outside of passage, nor does irrelevance itself posit such eternal natures or objects. Irrelevance means, of course, not relevant to some situation. The motion of the earth is irrelevant to the spatial separation of two stations of a railroad system and the earth time of the train that traverses that distance. In the movement of the earth about the sun that distance is continuously repeated. It would be nonetheless true that in a geocentric universe that distance would continuously pass in the passage of nature, and in that passage there would be a continuous repetition thereof. That any such pattern should endure implies, then, an aspect of nature which is, to use Whitehead's phrase, patient of that endurance. Such an aspect of nature is the consentient set of the earth as at rest with the sun and other heavenly bodies moving with reference to it. On the other hand, a building whose structure is out of balance is a pattern of which nature is not patient. Its pattern is not irrelevant to passage. The patterns of atoms, molecules, and crystals are varyingly irrelevant to passage. In varying degrees nature is patient of their structures. Furthermore, rhythmical recurrences which thus involve passage may as processes be irrelevant to passage.

The relations of elements within a pattern or structure are logical relations and become meanings when they are indicated by a human individual to others and to himself, while the relations of passage of things which do not preserve a pattern are causal. Where such a relation of passage, such as that of a planet around a sun, or of an electron about a proton, falls into such a pattern of which nature is patient, it becomes logical and takes on meaning. We speak of causation within such an enduring rhythm of change when it is analyzed into a composition of forces, e.g., the centripetal and centrifugal, so that each

position appears simply in its relationship to that which preceded it. Or we speak of causation when such a rhythm of change is brought into relationship with an outside change such as of interstellar material to which the solar system approaches. In general, we speak of causation in the presence of change which involves absence of or departure from endurance. On the other hand, we speak of what I have called the "logical relations" (which pass into meanings) in the presence of the endurance of structures of rhythms of change.

A perspective is the continued relationship of a structure to nature which involves change in its maintenance. If no change were involved in its maintenance, it would disappear in a more extensive structure and would lose its identity as an individual. If we state the universe in the abstract terms of the passage of spatiotemporally determined energy, the simplest form of a perspective is a structure of energy particles—i.e., energy spatiotemporally determined—as a consentient set with reference to which everything else either endures or changes, i.e., is at rest or is in motion, for in this abstraction all change exhibits itself as motion in relationship to a here and a now, or a there and a then. While this structure maintains itself, that is, endures, the universe is patient of it and exists in relationship to it. It is equally legitimate to regard the universe from the standpoint of any other structure within this abstraction. It has been the achievement of the doctrine of relativity to show conclusively that spaces and times exist only in such perspectives, that there can be no absolute space and time of which these spaces and times are parts or to which they can be reduced, that there can be no absolute rest and motion, and that, as the spatiotemporal determination of energy can be stated only in terms of motion, these characters are also relative to perspectives. The outstanding technological achievement has been the development of such a mathematical theory that the scientist within one perspective, having determined the characters thereof in terms of its space and time, can simultaneously place himself in another perspective and translate these deter-

minations into the space and time of this latter perspective and vice versa. One of the implications of such a theory is that it is possible to isolate an event in different perspectives as still identical, though its spatiotemporal and energy characters vary. An absolutistic doctrine has assumed the existence of the events in a realm of absolute reality, of which the perspectives would be but partial presentations, nor does the conception of relativity preclude such a realm, but it does preclude the customary statement of this realm in terms of the Newtonian absolute space and time. Beside this conception of an absolute world of reality of which perspectives are partial presentations, there appears another possible conception, that of a universe consisting of perspectives. In such a conception the reference of any perspective, as a perspective, is not to an absolute behind the scenes but from one perspective to another. The former conception is rooted in an Aristotelian conception of substance whose reality implied absence of change and, hence, timelessness. In terms of a Newtonian mechanics this came back to spatially determined mass, whose nature was unaffected by the spatial changes which time makes possible, that is, unaffected by motion, and to laws of motion whose uniformities being irrelevant to temporal differences also attain timelessness. If timelessness is not the characteristic of reality, however ultimate it is conceived to be; if change is as ultimate as endurance, and they mutually implicate each other; if what is changing in one perspective may be enduring in another and vice versa—then the reality which science or knowledge seeks must find its criterion in some character other than irrelevance to change.

What we seek in knowledge is not irrelevance to change as such but irrelevance to the changes within which our problematic situation has involved us. There are promises in the spatiotemporally distant environment which are denied or have become doubtful because of other features in the environment. These characters cease to be dependable, to endure, and we seek those characters whose promises as given in distance perception will ultimately justify the responses which are already aroused.

In direct perception these promises are the contact experiences which the distance experiences anticipate in the sense that they invite to approach or departure while they initiate the contact responses which the whole act involves. Even the scientific object which lies beyond the possibility of contact experience has a reality that is expressed in the energy that occupies an extension of space-time to the exclusion of anything else. If one asked one's self the question, "Does a specific electron actually exist?" the answer would have to be in these terms though the characters of the electrical particle that occupied that portion of space-time would not be exhausted in this effective occupation of extension. The reality of the electron as a physical thing would be expressed in its occupation of a specific portion of space-time, and such effective occupation of space-time is the essence of contact experience, however far beneath the possibility of such experience the minuteness of the hypothetical particles has removed it. It is true that the space-time of exact physical science differs from that of sense perception, but it retains its extensiveness and the boundaries that define occupation. It is in these that physical existence is defined. In other words, if we assume that the extensiveness of nature is in so far to be identified with the extensiveness of the perceptual world that the time system is determined with reference to a perceiving event, then the perceptual criterion of reality, the fulfilment of the contact reaction aroused in distant perception, must in however abstract a sense obtain in the space-time of science; and this I take to be such an occupation of a bounded portion of extension that it would resist successfully the occupation by any other body of this same portion of extension which it occupies, and that this resistance is never evidenced by direct distance perception but by inertia, though we may be dependent upon distant perception for the indirect evidence of this essentially contact character of experience.

It is, then, the enduring resistance within a certain minimum bounded portion of space-time which excludes any other occupation of that extension that is the precondition of the iden-

tification of a physical object, even if it is an ultimate object of the physical sciences, and though the evidence of this effective occupation of extension is indirect. Distance characters such as color and sound and odor and taste can occupy the same bounded extension and can vary without necessarily involving a change in the real existence of the physical thing. The character of the effective occupation of a bounded extension cannot vary without a change in the physical object. The so-called secondary qualities are said to inhere in the substance of extended resistance. In the manipulatory area one actually handles the colored, odorous, sounding, sapid object. The distance characters seem to be no longer distant, and the object answers to a collapsed act. The fact, however, that the so-called secondary characters of the object are functions of the temporal dimensions of the act reappears in the physical theories of these qualities. In taste and odor a chemical activity travels from the resistant particles which are considered the reality of the object to the organism. In color and sound vibratory processes relate the object at a distance with the organism. The imagination, quickened and enlarged by the apparatus of magnification, expands the manipulatory area not only in its spatial dimensions but also in its temporal dimension and gives different dates to the object as affected by distance characters from that which belongs to it as a congery of mass or energy particles. As mass or energy particles, objects can exist simultaneously. As colored, sounding, tasting, and odorous, objects involve the passage of various physical and physicochemical activities which are irrelevant to the existence of the mass or energy particles.

It is this collapsing of the act which is responsible for the so-called subjective nature of the secondary qualities or objects. In the manipulatory area the characters that have different dates, i.e., the distance characters and the contact characters, become contemporaneous. For the date of the distance character is the date of the contact experience that it promises, but the endurance of the contact pattern is irrelevant to the passage that lies between the promise and the fulfilment, and we see the

distant object in a manipulatory area. But the price of seeing the future as present is the substitution of the seeing for the seen. It is only the seeing that is contemporaneous with contact reality. That which is seen is contemporaneous with a reality that is not yet. It is true that the contact reality which we will experience endures and is irrelevant to the temporal process that lies betwixt and between. We see the thing that may be said to be existing now, but the visual content cannot be identified with the thing that is existing now; it can only be identified with the now of the seer. Taken as existing now it is a subjective substitute for an objective reality that lies ahead of us. On the other hand, we restore it to objectivity by seeing it as something that we will handle. The two attitudes are entirely distinguishable. When we are not reflective, we walk out into a world that lies ahead of us in space-time, and it has the latent uncertainty that belongs to the future that is part of the specious present. Its ultimate reality depends upon the accomplishment of the act. At any moment the firm stone may sink under our feet and the approaching wall become a figment, but what we saw was there as a promise which later was not fulfilled. But if we reflectively extend our manipulatory area to the distant scene and insist that the distant object is existing now in the same sense as that upon which our feet rest, we must relegate the vision of the distant object to the now of the organism that rests upon the ground. The connection of the distant object and the organism must be in terms of the realities of the contact area. At a moment the universe may be thought of as consisting of energy particles distributed throughout a momentary space. This is a perceptual world only in the sense that the resistance of these particles comes back to contact experience. The full perceptual world exists ahead of us, in futurity. We can hypothetically determine what arrangement of particles there must be in order that the distance characters of the object there should be what they are at any one moment. We reach this determination by the discovery of enduring processes in nature. We can then determine that the object which is spatiotem-

porally distant from us must be characterized by certain motions of its energy particles at the time that it is characterized by, say, a certain color, but the statement in terms of energy particles and their motions is never a statement in terms of color. Conceivably an organism capable of experiencing the resistance of these energy particles might have experience of the vibrations, but not only would this experience be of vibrations and not of color but the vibrations experienced would be always spatiotemporally distant from the color to which they could be conceived of as answering. Even in the manipulatory area our physical theory of color, as well as of any other distance experience, separates the statement in energy particles in space-time from the color, however minute that distance may be. The contact experience promised in the color, and hypothetically attained in an instantaneous distribution of energy particles, will always be ahead of the color to which this distribution answers. It is true that on the assumption of endurance of the rhythmic process of vibration we can argue that this same sort of distribution of energy particles will be taking place when the color is present, but the vibration that is taking place at any moment when we determine the distribution will answer to a color not yet in existence. For example, the vibrations that are taking place at any determined moment on the surface of the sun are some eight seconds ahead of the visual sun in the perspective of the physicist who determines that moment. It is true that eight seconds later the same sort of vibrations are taking place on the sun's surface, but they are not those which answer to that visual sun.

Current theory states this situation in terms of a causal nexus between the vibrations on the sun's surface and the disturbances in the central nervous system of the physicist. It then locates the visual sun in the consciousness of the physicist which is supposed to come into existence in answer to the excitement in the nervous system. Certain implications of this theory are correct. If the sun ceased shining, for eight seconds after that event the visual sun would remain in the heavens of the physicist, and

there is a one to one correspondence between the vibrations on the sun's surface and the spectra appearing eight seconds later in the physicist's laboratory. The promises involved in the visual heavenly object are subject to errors which in the case of distant stars may be enormous, and the correspondence discovered between the causal nexus and the characters of the visual object is established between these characters and that part of the nexus which immediately affects the nervous apparatus of the living organism. That is, while the object that we visually perceive lies in the future at the end of an initiated act, the characters that we visually perceive correspond to an object that has already passed. This is, however, nothing but a statement in perceptual terms of the nature of human intelligence—that it builds up its future out of its past.

VIII

MEDIATE FACTORS IN PERCEPTION

WHITEHEAD recognizes that a perceptual object implies the assumption that the object would be there for an indefinite number of other percipient events besides the one in whose perspective it lies.¹ This recognition on his part seems to spring from the seeming assimilation of other points of view than that of the particular percipient event in his perception. He does not present the values of other perspectives as inherent in that which goes to make up perception. The essentials of perception he finds in the sense object and its firm association with other *sensa*, plus its "conveyance" of still other sense characters, not immediately given in the sense process. It is the permanence of this association including the "conveyance," which for Whitehead is the peculiar value of the percept. These characters belong to the perception in the perspective of the particular percipient event. While other values may come to the percept through this fusing of other perceptual perspectives with that of the particular percipient event, they appear as additions without playing a constitutive part in the percept as such. In other words, from Whitehead's account of the essentials of the percept, these fused values could be omitted and the percept would retain its character as a percept.

Furthermore, Whitehead indicates no apparatus by means of which these values from other perspectives can be brought within the perspective of the particular percipient event. It is true that he does not undertake to give a psychological account of perception. He is dealing principally with the percipient event as the seat of the awareness of the mind, that is, as the body within which this awareness is situated. However, he does indicate in his account what is the mechanism involved in the

¹ See A. N. Whitehead, *The Concept of Nature* (Cambridge, 1920), pp. 110-12.

process. This mechanism is that of the sense organs and the central nervous system of which they are essential parts. The stuff of the percept are the *sensa*, which are the immediate deliverances of the sense organs with their apparatus. That which besides the firm association of certain of these *sensa* is "conveyed"² by these *sensa* comes in large degree from recollection and memory. What comes in this fashion may perhaps be assumed to come in the form of other perspectives of other experiences of the percipient event, and it may be further assumed that the percipient event or his mind utilizes the same mechanism by which he organizes the past perspectives of the individual percipient event to introduce the perspectives of other percipient events into the percept. It is at least important to recognize that the same mechanism is involved in the two phases of the process. Some further light is shed on the process by Whitehead's statement that our percepts lie in a field of nature which is common to others of the community. He distinctly pushes to one side the problem of this common content of experience, or rather this experience which appears as common. One further passage which throws a little light on the matter is found in his treatment of motion in the specious present, as an experience of the percipient event. Here he is taking his example from the traveler in the train. The traveler is spoken of as cogredient with the train as at rest, while the landscape flies past him. But he recognizes a double cogredience here. The traveler finds himself cogredient not only with the train as at rest but also with the landscape, i.e., he perceives the landscape as that which at rest is passed through by the train, while he feels himself at rest on the seat of the train, which so far as his body is concerned remains a consentient set. Here again we are left without any discussion of the mechanism by which such divergent attitudes are organized in a unitary process of perception.

The problem lies in fitting together the deliverances of different perspectives into a single perspective. We may deal first

² *Ibid*, pp. 154-55.

with spatial perspectives, which lie in what Whitehead calls the permanent space of some time system, i.e., the time system of the percipient event in question. When one sees a house and has as a part of his perception some recognition of the back of the house as it lies in its relationship to the front which he is immediately observing, he is using a perspective of some former observation when he viewed the back of the house as he is now viewing the façade. There may be in his perception only such an organization of attitudes of response as would lead him if he went around the house to be ready to act toward the back door as he has acted in the past. This would not involve his seeing the house as having the back which he saw on previous occasions but only such familiarity with the house as he might have with a well-known path. He would feel ready to act with reference to it without any sensuous reconstitution of the object. On the other hand, one may in seeing the house so reconstitute the construction of the back of the house that he has some part of the structure of the back present with what is before his eye. The critical import of this sort of sensuous or perceptual construction is found in the situations in which what is actually present in, say, the visual datum is seen in the form in which it would be seen if one were in another situation. Here is found the much belabored penny, that is seen as round though the contour that is presented to the eye is an oval or a line. A favored perspective practically supplants that which is immediately given in the so-called sense datum.

The problem which is involved in this phase of perception is that it cannot be accounted for by a mere fusing of one content with another. One cannot fuse an oval with a circle. Nor is it a mere substitution in the fashion in which the visual deliverance of one retina is substituted for that of the other in certain situations. For in this case one can recover the image which is rejected and hold also that which is selected for perception, and this cannot be done in this case. One cannot hold over against each other in the perception the oval penny and the round penny as actual so-called *sensa*. This can be stated in terms of

interpretation, in terms of Berkeley's theory of vision. The datum in this case is there never as a mere visual content but as an indication of the experience of manipulation, and our percept of the penny is then in terms of the action under the conditions of most advantageous conduct. This still leaves the question open of the visual contours in the two situations. However they are interpreted, the two contours are facts of experience. One can see the oval, and one can see the circle. One does not fuse them, and one does not push one aside and see the other.

What is evident is that the attitude of the use of the penny, the manipulation, becomes the dominant attitude and controls the act of perception. We act toward it as round. In Whitehead's terminology the oval form "conveys" the roundness of that which one handles. It is this conveyance which carries the problem.

The conveyance involves not simply one final attitude but a number of such attitudes. We are ready to do various things or carry out various acts or parts of acts with reference to the things and utensils which we manipulate, and we carry these different attitudes in an organization within which they do not conflict with one another. We see the oval penny as round, and its ellipticity is just that which, given our situation, enables us to see it as round. There is involved in this a temporal character. A movement will give us the round penny, and there is the same entrance of the movement as that which we find, for example, in seeing the hammer as that with which we drive the nail. The percept is a collapsed act. The degree to which roundness and the ellipticity enter in as visual contents of course varies, and as a rule what takes place is that we select out those characters which set the attitudes into activity and prepare for later steps.

In certain cases, such as that of the bent stick in the water, the lines of railway tracks approaching each other at the horizon, and the psychological puzzles, it is not possible to organize the attitudes so that the content of the perception becomes one

univocally answering to an ultimate attitude. Perceptual judgment comes in to rectify these illusions of perception, and these shade off into mirror illusions and the seen distances of heavenly bodies. In all these cases, however, there is a percept which itself is the product of an organization of attitudes, though it is to an object of reflection that we respond rather than to that of direct perception.

The important distinction to be drawn is between an organized act which does not carry with it the content of the stimulus, or some portion of it, to which later stages of the act will respond, but simply leaves the organism ready to respond to these stimuli when the earlier portion of the act is accomplished, and the perceptual act which does carry at least portions of these stimulations, so that they pass into the content of the percept. We see the object as hard or round; we see the man at a distance as the one with whom we will shake hands when he is immediately before us. It is these contents in their organization which give to the experience its perceptual character.

The problem is to discover the principle of this type of organization. There seem to be different acts. There are the sight of the object and the response involved in moving toward it. There is also the attitude of readiness to handle the object, and perhaps a series of such successive acts in its manipulation; and for each one of the acts there may be elements in the object which act as specific stimuli. On the other hand, as already remarked, there may be no identification of these peculiar elements in the object which answer to the successive responses. In this case it is not until the later situation arises that the element in the object becomes a stimulus to the individual to respond in the proper fashion. But even in this case the ease with which the earlier step in the complex act goes off may be an indication that this step is an organized part of a disposition or nervous structure, in which each step leads up to the next involving a susceptibility to the proper stimulus to set this step free. I take it that it is this sort of attitude which passes under the name of the "feeling of familiarity." As contrasted with this

we have the situation in which we not only respond to the stimulus which calls out the first step of the composite act but also are susceptible to the element of the object which will call out the next step of the act. Such susceptibility, however, implies some sort of response to the stimulus. It may be laid down as a principle of our experience that the presence of stimuli in the conduct of an organism implies also response to those stimuli, there being no entrance to stimulations unless some door of response is open. The nervous mechanism is a system of paths. In recognizing this principle, it is necessary to recognize also that language is ambiguous. We refer to the object under the same term, when so far as response is concerned there are two objects present. The door that is bolted on the other side is referred to as a door, though it is a barrier from which we withdraw. It is to different characters of the object which we respond, one gate being closed while another is open to response or nervous conduction. The term "response," however, must cover not only the completed muscular contraction but also those processes in the upper reaches of the central nervous system in which the co-ordinations take place which make complex reactions possible. We may refer to these processes as attitudes. Thus in reaching for a hammer we already have in the organism the attitude of striking with the hammer. If now there are present in the experience not only the visual stimulus to reach for the object but also the characters of the object which initiate the response of striking with the object, we have excited those nervous elements which are responsible for the beginning of this later act in its co-ordination with the earlier phase of reaching for the object. Also there enters into the experience what is called the imagery of the result of the response. We feel the hardness of the hammer handle and something of its balance in the hand before we actually get it into the hand. Now all these phases of experience are essential to the perception. The organization of a composite act and the imagery of the result of the act as giving the situation from which later conduct goes out make out of mere distance stimulation a percept. It seems

to be this which Whitehead refers to under the term "conveyance." I see the object as I may later respond to it.

It is important to recognize that this attitude plays a most important part in determining the actual content that appears as the distance experience. What I see will depend upon what I am going to do later. There are selection and organization in the perceptual process. It is the subsequent attitude of greeting and conversing with the distant friend that enables me to see him not only as a friend but in the dimensions which he will have when I am near enough to him to carry on the conversation, and it is the putting of the penny in the purse that enables me to see it as the object which I will have between the fingers in the spatial form which it will present to me at that time, for that spatial form will be the stimulus which will direct the hand in its pursing of the penny. All this is essential, at least in attitude, toward our distance experiences, to render them physical things.

Now readiness to respond at a later moment under the conditions which will obtain at that moment, owing to the carrying-out of the earlier part of the process, has in it implicitly the perspective of that phase of the act. The development of this implication one can experience in examining a cliff which one thinks of climbing. He sees not only the cleft above him but has only to develop the percept to feel himself in it and reaching for cracks and protuberances for the further advance. He gets in some degree the face of the cliff as it will extend above him when he is there. He has the sense of unbalance or insecurity which the situation will bring with it. We have, of course, to distinguish sharply between the immediate perceptual situation and that of the perceptual judgment. In the latter case one definitely isolates elements of the situation and follows out their meaning by the use of symbols. One argues that such a position will be insecure from the character of the rock, or that the cleft is too narrow to afford a footing. And this argument may be carried on in the inner forum with very exiguous logical apparatus, but the distinctive mark of the judgment is there: the passage from some character to a consequence by way of an

indicated meaning. The passage is already accomplished in the percept, i.e., one perceives the insecurity. Undoubtedly the character of the rock is effective in conveying this perceptual attitude, but the resultant insecurity is an attitude which is given in the experience. The judgment is then an elaboration of a situation in which the relation between stimulus and response is isolated by the use of a symbol. But a situation that is so analyzed may lead to a synthesis. The separation of the stimulus from the resultant response opens the door to other possible responses. Perhaps I should say that the separation of the stimulus from this response makes possible the recognition of different characters within it which opens the door to other responses. In any case, another response has become possible and, with further experience, will appear in the conveyance of this resultant directly in the percept. This may take place without reflection in the so-called trial-and-error process. We come through unreflective experience to perceive in the objects of our use contents which were not originally there, but the learning of the human animal can proceed logically from the analysis which frees the stimulus from a specific response and thus opens the door to other responses. There is, however, a difference in the results of learning by trial and error and learning through reflective experience. In the first, one acquires familiarity merely, while, in the latter, one may retain the different values of the stimulus and hence the different possible responses. In the latter case, as the result of past judgments, one now immediately perceives what we call the meaning of the characters of the percept and consequently the different attitudes corresponding to the different characters of the stimulus.

It is this situation that I referred to above as in some sense carrying different characters which would be mutually inconsistent if they belonged to the same temporal phase of the act, but which become consistent when they mediate the attitudes which represent the successive steps in the act. From one position we see the penny as round even though it is an oval form that registers itself upon the retina, because its oval character

is the stimulus to the movement which will bring it into what is the standard form for our conduct with reference to the penny. To see the penny in the character of initiating the movement to bring it into the normal position is to see it as round, for that is the resultant of that motion which arises from past experience to justify this organization of attitudes. The content of ellipticity is there not as resultant but as stimulus to bring about the normal content which imagery may supply. The selective power of perception reduces ellipticity from a resultant to a mediate character of our spatiotemporal environment, which is organized to lead up to a certain goal. The imagery from past experience supplies the visual form of that goal, as it supplies the content of much that we read upon the printed line. Changing the goal of our attitude toward an ellipse at once places the present visual form of the penny in a final instead of a mediate situation, and we make the mistake of assuming that it was there in that character in the earlier situation. We are familiar enough with this shift in values in perception, and hence a shift in the actual datum of experience. Looking through a landscape toward a distant goal, what lies between us and the goal is organized with reference to the passage to the goal. Each intermediate object has a definite value for conduct as the clue to the step and direction of the step which it indicates. It is a map of the traject in which contents of the intervening objects sink almost entirely into marks of the path. But let some movement take place within this environment which leads to a different orientation, a possibly different goal, and the objects (or some of the objects) fill out into percepts that were absent from our former perception, though a photograph from the position of the individual would have given just those characters which are absent from his earlier experience. Mr. Russell's substitution of cameras for the visual apparatus entirely suppresses this character of perception.

I have argued here as if the visual datum in imagery were always and fully present in perception, which is, of course, a condition contrary to fact. It not only ignores the vast differ-

ences in individuals but also ignores wide differences in the dominance of different types of imagery in the same individual. So much, I am confident, is correct that in so far as a percept of the spatiotemporal object is present, as distinct from the simple familiarity with the intervening landscape which may lead to the same goal, in so far as some content out of past experience, which stands in the place of the result of the act, is always there in the percept giving us our feel of the reality of the construct which is in any case to some degree hypothetical. Seeing is believing, but it is believing and it never passes out of the range of probability until it is supplemented by the Thomasian touch. Some imagery of the result which is the surrogate of this Thomasian touch conveys the assurance which goes with perception. We could not perceive an utterly novel object.

We may now return to the different forms of perspectives which the temporal nature of the act implies, and which justify its description as a collapsed act. In the organism I have spoken of these as attitudes or co-ordinations which in the higher centers of the central nervous system are the organizations of different responses that in their temporal succession will accomplish the act which a perception stands for, at least as a possibility. If they were taken in their severalty, each one would involve a different perspective, and we may so disengage them, for example, in the perception of the cliff to be scaled. The eye of the adept climber may take in the cliff with a glance that has in it different stages of the ascent. A careful survey will isolate each of these and place the alpinist in each critical spot, with the elevation which the cliff will present from that *pied-à-terre*, and his final grasp will group these in one map of his objective. It is this sort of mapping of his environment that goes on in the experience of the baby as it advances from reaching to creeping and from creeping to walking. Perception of the room means the slowly acquired collapsing of various separate excursions into charts of more elaborate undertakings.

As we have seen, this may come out in simple familiarity, and one may not perceive his room as a whole but go securely from

clue to clue accomplishing his concatenated activities. It is fair to assume that this is the sort of landscape within which animals other than ourselves do live. The mark of the perception is that it carries contents which are not the immediate stimuli for the next step in the act but are occasions for other responses. These responses, in the first place, locate the object either as an objective toward or away from which motion is aroused or in its relationship to other objects which form the field within which such motion with reference to an objective takes place. That is, they form parts of a variously diversified landscape that is organized with reference to some actual or potential conduct. In the second place, in so far as this is possible, and in certain regions of stimulation this is only vaguely possible, we perceive objects as physical things, and this means that we perceive them in terms of contacts of the body, but more particularly in terms of the contacts of the hands. These responses give us the detailed dimensions of things, and they give them within the radius of our possible manipulation. In other words, they establish the absolute size of things as over against the relative deliverances of our distance experiences. The initiation of the attitudes of tactual response, particularly of manipulation, provides us with percepts which are physical things of certain dimensions and magnitudes.

We have traveled so far from infancy that it is with difficulty that we can get behind the *tabula rasa* doctrine of perception and regard percepts as more than *sensa* associated together with varying degrees of permanence. The difficulty is enhanced by the fact that we act so much in a field of a fifth dimension of the social symbol, the field of language, leaving action so largely to trained automatisms. Still it remains true not only that the world of physical things arises out of locomotor responses to distance stimulation and our contact responses (especially of the hand) but also that it is just these varied possible responses which the physical thing holds in experience which offer the primitive logical field within which the social symbol can operate. The multitude of possible responses which constitute medi-

ate things that lie between our impulses and their consummations opens up the field of indication and reference out of which language can arise, though the two processes undoubtedly work together.

By placing the perception of physical things within the act, we find that such perception is not the final character in experience. This is commonly termed "consummation." The common illustration is that of eating. If we retreat to the dog, we must locate the analogue of the physical thing in his experience in the contacts of his jaws. In the act of eating we are not able to separate here the physical thing from the experience of satisfying the impulse. When the dog carries a stick or the bitch picks up a puppy, the beginnings of the experience of a physical thing can be detected, but the physical thing must play a vanishingly small part in the dog's experience. What calls for emphasis in this genetic approach is that the place in the act at which we must locate the experience of existence or reality practically vanishes. In the dog's experience hunger, fearing, anger, the sex and the parental impulses are present, and satisfactions and dissatisfactions, but there could be no mediate things that simply exist, that can lead to other things or to consummations, or any assurance of existence. There would be the unease and distress which belong to want, but no world within which the presence or absence of the object of desire could be placed. Consummation is satisfaction and, if you like, happiness, but in itself it is no assertion of the existence of the things enjoyed or of the enjoyment itself. Existence in the field of experience belongs to mediation, and mediation belongs to percepts in the sense in which we have presented them. The degree to which these things can enter into the experience of apes depends upon the degree of use to which the ape puts the objects of his manipulation. Köhler certainly found certain situations within which the beginnings of things could be located, but even here they must occupy an utterly insignificant part of the ape's experience.

There is another comment which this genetic approach calls

out, and that is the enormous distance which the socializing of the human animal places between his things and the consummations to which they ultimately lead, on the one hand, and, on the other, the indirect relationship between the individual's own consummation and the things in their mediate sense with which he operates. A moment's comparison of human society and the society of the ants, termites, and bees perhaps brings out the import of the remark most clearly. In these societies the biological end is one that cannot be brought within the experience of the different individuals that make up the societies because these results are reached through physiological differentiation. There is one hymeneal flight, one insect that lays all the eggs; there are neuter forms that care for larvae, and fighting forms. What has made human society possible has been a co-operation through communication and participation. The very stimulus which one gives to another to carry out his part of the common act affects the individual who so affects the other in the same sense. He tends to arouse the activity in himself which he arouses in the other. He also can in some degree so place himself in the place of the other or the places of others that he can share their experience. Thus the varied means which belong to complicated human societies can in varied degrees enter into the experiences of many members, and the relationship between the means and the end can enter the experience of the individual, but notwithstanding this psychological apparatus of sociality the distance between means and ends in human life is enormous and is never completely overcome, and the operation of society is largely dependent upon a social differentiation which takes the place of the physiological differentiation of the insect, so that the individual end generally fails to expand through communication and participation into the social end which is the *raison d'être* of the co-operative process. Just this distance, however, and the effort to overcome it stimulate the logical and ethical processes involved in communication and participation.

It follows from what has been said that a physical thing as it

exists in experience answers to an organization of attitudes. The physical thing itself has a certain structure which belongs to it in independence of the organism within which lies this organization of attitudes. A broken branch of a tree had a structure of its own before a primitive man seized it and by his use made a club of the broken branch, and the piece of flint had a certain density and friability in advance of its use as a knife. The woods and metals which we use in our elaborate manufactures have certain molecular and grosser structures which adapt them to our service before they enter into the world of human things.

The recognition of such structures in their independence of human utensils brings before us the question of organisms lower than animate forms and their relation to the world in which they exist. In Whitehead's definition any structure which is the seat of a process that reproduces a certain pattern is an organism if it requires a certain temporal stretch within which to be what it is. To such an organism, in Whitehead's terms, the world must be "patient." This is the condition of its continued existence. In other words, such an organism has an environment, and in the mutual adjustment of organism and its environment we may find a perspective. Whether Whitehead assumes that such an organism determines a time system and thus a "here and there, and a now and then" I am not sure, though this seems to me a logical conclusion of his position. The implications of Whitehead's doctrine, especially as interpreted in the note added to his second edition of the *Principles of Natural Knowledge*, is that what anything is, i.e., its substantiality, is to be found in a process, and the elements of the structure, such as the electrons, are abstractions from these processes. The element would then only be found in the momentary cross-section of a process, which Whitehead admits is only an ideal state which does not exist but is sought in thought as the limit of the process of extensive abstraction, for the purpose of the formulation of the exact laws of nature.

If this is a correct interpretation of Whitehead, the process

within its "epoch" is the ultimate existent and constitutes the event. This event, however, in so far as it determines a "here-now," is conceived as at rest and in that attitude would determine a time system. The "patience" of the world to the organism is found in this time system which includes all events in a duration. The difficulty that arises in this interpretation of Whitehead is bound up with his conception of ingression. The pattern of the process, which constitutes it what it is, has ingression into the event, i.e., the pattern must be conceived of in independence of the event. The event must be there in logical precedence to the pattern. This may be overcome by the reference of the patterns to a world of subsistence, the world of eternal objects, in Whitehead's nomenclature. Ingression in this case would be an abstraction which does not exist in nature.

IX

THE SOCIAL FACTOR IN PERCEPTION

THE experience within which the intelligence of human society expresses itself is a world of physical things. It is also a perceptual world. The thing and the percept bring out two characters of this experience. The percept marks the experience as a perspective. The characters of a perceptual world are dependent upon the susceptibilities and attitudes of the individuals who make up human society. The physical thing marks the experience as an organization of perspectives. So far as the thing is in experience it lies in the perspective of an individual, but if it is a thing it may lie in the perspectives of other individuals as well. The perspectives, however, are not separate from or independent of one another. The thing which an individual perceives is or may be perceived by others who are fortunately located spatiotemporally and similarly endowed. The individual perceives the thing which the others perceive. Both the thing and the perception have this generalized character. It is within this organization of perspectives that criticism, doubt, and adjustment take place. One does not criticize one's own perspective because of a reported disagreement of this perspective with that of another or others. The disagreement, the doubt, and the error break out within a world which is common, but which still exhibits features which are in conflict with its universality. These features, then, come to belong to individual perspectives. Thus in experience the individual perspectives arise out of a common perspective. The common perspective is not built up out of individual perspectives. The identical penny of experience is not a compound of all the varying shapes of different perspectives. On the contrary these contours are differing and in some sense contradictory shapes of an identical penny. This commonplace, that there is

no doubt except in a world whose universality justifies that doubt and tests the solution of the doubt, seems to be at odds with the genetic account of the development of a world of common experience out of the experiences of the individuals who make up the commonalty, or society.

The solution that I am suggesting involves, first, the fundamental character of sense perception as that of a distant object. I am affirming this in a behavioristic sense. Sense perception is an outgrowth of the behavior by which organisms relate themselves to what is spatiotemporally away from them. This relation is a form of conduct that leads the organism toward or farther away from the object according as the act predicates contact or the absence of contact. Contact in the positive or negative sense is the outcome of the act that lies at the beginning of sense perception. This outcome results normally in an experience which is both distance experience and contact experience. In our typical sense perception we see what we handle. There is, then, a certain area implied in sense perception, within which contact, the immediate outcome of the act, takes place, while we still see it, or have distance experience of it. It is a mediate area, for consummation lies beyond it—for example, eating, rest, or warmth. I will call it the manipulatory area, for physical things are plainly things that we handle, but the handling is normally under the control of vision. Contact is the test of the success of the act and decides whether we are subject to error or illusion. The thing is there if we have or could have contact with it. Otherwise it is hallucinatory.

Sense perception thus interpreted belongs to organisms that have hands and handle things in completing their acts. It implies further an arresting of the act in this manipulatory area and the reference of both earlier and later experiences to that of this area. It is the object of possible contact that we see at a distance, and it is such a physical thing that we later enjoy. The substantial reality of our perceptual world lies in this area of manipulation and its extensions, and the other characters of things inhere in this substantial reality. We have indeed many

illusive perceptions, such as many sounds and odors which we enjoy without definitely referring them to physical things located in certain areas, but we do not exhaust the demand for the reality of these experiences unless we can so refer them. This area, as I have remarked above, lies short of the completion of the act, its consummation.

The essentials of perception lie not in the organization of various so-called *sensa*, or merely in "conveying" one sensory content by another, but in this definite reference of distance experience of the object to the mediate contact experience of this area, the distance experience being that of which the contact experience is the perceptual reality; and in the reference of later experiences in the way of consummation or further implementation back to the physical thing, i e., the perceptual object in this manipulatory area, where it is at once an object of distance and contact experience. The term "reference" which I have here employed, does not necessarily imply reflection, the so-called judgments of perception. The reference simply involves the direction of the act toward its mediate completion in the contact processes of manipulation. Fully realized existence of the perceptual object belongs to this field. It is of importance to recognize that it is not the character of tactual or contact experience in itself that carries with it perceptual reality. It is the successful completion of this portion of the act initiated by the distance experience that gives reality to the physical thing in the manipulatory area. Physical contacts with currents of air may be distance experiences of objects away from us. It is also of importance to recognize that perceptual reality is a mediate field within the entire complex act. The possession, enjoyment, or suffering of physical things is over and above their physical existence. Their physical existence is the condition of the final consummation of the act, especially of further mediatory processes which lead to the consummations of existence.

The second implication of the physical thing indicated above was its arrest of the act. It is picking the fruit to eat it. While we hold the fruit and prepare it for the table, the process of

consumption is postponed, but we have selected those characters which are irrelevant to the passage involved in the on-going act of consumption. So we speak of the fruit as existing throughout the whole process. In the experience of lower forms which have no such manipulatory area there is no reason to believe that there is any permanent world which is irrelevant to passage. They must live in a Minkowski world where all stimuli are spatiotemporally away from them.

There are experiences of our own in which the interest is so centered on the temporal distance of the stimulus that it hardly appears as an object that exists simultaneously with ourselves in the manipulatory area, e.g., when we are straining to grasp a passing something, when in falling over a cliff one strives to get hold of the stem of a sapling. There is no reality now. It all lies spatiotemporally ahead of us. The simultaneity of things belongs only to that situation in which competing responses inhibit one another and throw into relief those characters that are irrelevant to passage and thus remain permanent conditions of alternative possible reactions. The mere inhibition, however, would not be sufficient to throw these characters into relief. Their irrelevance to passage must be of importance to the organism, must have become the condition of further conduct, before these characters can stand out and become the enduring environment.

This enduring environment has as its center the manipulatory area in which is found the unquestioned physical thing. It is seen, and that which is seen has been realized in contact. The contact, however, is not simply a pressure, not simply a hardness or roughness. It is primarily a resistance. The contact experience that constitutes the reality of the physical thing comes from the inside of the thing, and it comes from an inside that can never be reached by subdividing the thing. This reveals simply new surfaces. It is an inside that springs from the co-operation of physical things with ourselves in our acts. We are seeking the sort of resistance that we ourselves offer in grasping and manipulating things. We seek support, leverage, and

assistance. The mediate act is completed in the resistance of the thing. It is the sort of resistance which one hand offers to the other. The inside of the thing is the same stuff as the inside of the organism. It would, however, be a mistake to assume that the organism projects this content into the object in the manipulatory area, for in the first place the organism is but another perceptual object, and in the second place there is no indication of any place in the act in which such a projection would appear.

I am going on the assumption that action is distinguishable from motion and that the identification of it with the sensation of muscle strain is a later interpretation, valuable for the purposes of the reflective control of conduct, but deceptive if it implies that action is there as a sensation or consciousness of an effort. In the simplest situation the organism is there acting or in action, and the characters of stimuli are there. Consciousness of action and of the characters in experience is a later reflective type of experience that implies that action, and these characters are there in advance of the so-called consciousness of them. Now what we mean by an inside as distinguished from that which can be revealed by removing something spatially exterior, which then becomes an outside, is action as it is going on, i.e., action discriminated from motion. Action proceeds from something, arises out of something. Otherwise it can be identified with change and ceases to be action with this implication of an inside that can never become an outside.

Resistance is action. It is not pressure as a so-called surface experience or any other surface experience. Physical things resist our action. This action of things gets into our experience, into our perspective, as the inside of perceptual things, and these perceptual things in the perceptual environment serve to define the organism as a perceptual thing. A perceptual thing is a combination of at least two characters, a distance character which leads movement toward or away from it and the contact experience which results. This contact experience includes its inside. If the organism is a perceptual object for the organism

as a whole, there must have been some phase of the act which was located outside the organism, from which position the organism could be a perceptual object. It is important to recognize that the insideness of the organism's activity could not be placed within the organism as a perceptual object until the act had placed the organism over against some outer position. Now the action of, say, an implement in the hand does place the hand and the organism of which it is a part over against the implement. What the implement does in the co-operative process serves to place the hand and the organism as a whole as one of the perceptual objects in the field. It is impossible to start off with the organism as an object and project its contents into other perceptual objects. The organism becomes a perceptual object only after the act is in some sense located outside the organism. This is, of course, the basis for reflective activity, in which the organism becomes an object to itself. Resistance as an activity is a fundamental character which is common to all physical objects, including the organism. From the standpoint of the resistance of physical things we resist them, but it is still necessary to describe an act originating in the organism that can be so located outside the organism so that the organism can become an object.

The resistance which is the matter of the perceptual object is an abstraction which has been rendered definite and dominant by the concepts of mass and inertia in modern physical science. The objects in the manipulatory area (in the widest sense of the term, our implements, those things by which we maintain our balance and through whose resistance we move and which we utilize for ulterior purposes) have in immediate experience the values which their uses predicate. It is only by an abstraction that we get down to their matter. The reason for the dominance of this abstraction is that we find that we can control the other implemental values through the concentration on the matter of the perceptual object. The knife still cuts, but it is its molecular structure that assures us of the cutting edge. The rose is fragrant, but the statement of the fragrance in terms of ethers en-

ables us to manufacture perfumes. For the same and like purposes we state the organism in molecular and atomic terms. The animal in which the act originates is not yet the material organism which in its own conduct exists over against other material things. It is a stimulus to other animals to seize and devour it, or to avoid it, or to woo it, or to suckle it. These stimuli are spatiotemporally separated from the animal they excite. They have as yet no existence present as objects for the animal. To assume such present existence, they must assume the "now" that belongs to the manipulatory area of the animal. If the act of the animal with reference to the second animal calls out a response in the second animal, such as flight or an answering cry, these responses become important stimuli in the continuation of the act. If they are cries, they are responses which the animal may excite in itself. If the response of the second animal which the first animal has excited in itself develops into a complete attitude, as in the play of little children, two results may appear. The result of one's own act may be given in terms of a now, and with this appearance of the other as an object the individual would also appear as an object, from that assumed point of view of the other. It is important to recognize that the mere appearance of imagery from past experience would not give a "now." Supposing it to be attached to the stimulus, it would have the same spatiotemporal distance as that of the stimulus. To reach a "now," the result of the act must be present as a part of the activity which excites it. It is this which renders resistance of so fundamental importance. The resistance of the thing we are about to seize can be excited in the individual who will grasp it, but the attitude must have been assumed before either the thing or the organism can appear as an object.

The assimilation of time to space, and the disappearance of any absolute time and space, carries us back to a situation of the passage of events in a space-time in which there are intersections of different time systems that give rise to passing repeating geometrical structures, whose points are historical

routes, and in which there is no permanent space and, hence, no motion, until relation to a percipient or prehensive event gives rise to a consentient set, or a perspective; the same analysis carries us back to an experience in which animals live in a Minkowski space-time, related only to spatiotemporally distant stimuli. The unity of the act is there, but it is a unity that is attained only in the completion of the act. It is not given in a permanent space, abstracted from passage, until the "now" of the ongoing process in the animal becomes identified with the spatiotemporally distant stimulus through acts of identifying itself with the stimulus, thus enabling the stimulus to share in the resistance which is the reality of the percept in the manipulatory area. In the manipulatory area both the distance promise and the resistance contact fulfilment unite in a percept, but the percept does not become an object except in a situation within which the organism is also an object. It is this involvement of the organism in the perceptual situation as an object which we denominate as consciousness, i.e., consciousness as awareness. It is, however, not a consciousness *of*, an awareness *of*, except at a later stage. In so-called immediate experience the object is simply there, but its being there carries with it the individual's being there, not as experiencing the object but as a perceptual object essential to the situation.

The original biological act is one that goes through to its consummation and has within it, at least in lower animal forms, no perceptual world of physical things. It is a world of stimuli and responses, a Minkowski world. Physical things are implemen-
tary and find their perceptual reality in manipulatory experiences which lead on to consummations. They involve the stoppage of the act and an appearance of a field that is irrelevant to passage in which alternative completions of the act may take place. The act, then, is antecedent to the appearance of things and of the organism as objects. It is illegitimate to place this original act within the organic individual as an object. The mediate acts that spring from our organisms take place in a permanent space that is abstracted from passage and go on in

time. As individuals or selves we are never at the beginning of our acts but carry them on in relative spaces and times by the use of physical means and so-called reflective intelligence. To reach a present experience that takes on the form of a present, a "now," which contains the distance stimuli, a number of conditions must be met. In the first place, the act itself must be inhibited. This can take place if alternative processes of carrying out the act arise in the organism. In the second place, there must be a stuff of experience of which this present can consist, which is irrelevant to passage not only because of the repetition of an identical pattern but also because it belongs to the same phase of the act in the various alternative completions of the act. It must be functionally identical if the present is to contain different alternative present possibilities. This can be found in the organism's contact experience of things which serve as means to final consummations. In the third place, that it may be a "now," i.e., have a temporal character identical with the organism, it must be content that does not simply attach itself to the distance stimulus and take on its temporal character, but it must be something that the organism calls out in itself, so that it has the temporal character of the organism. This can be attained if the organism excites itself to respond to itself as the distant stimulus would respond to it if it were at the completion of the act, i.e., were in contact with it. The theory of the subjectivity of secondary qualities exactly reverses the actual situation. The distance characters of stimuli are spatiotemporally away from the organism; but, if the resistance of things, their inner matter, is to be dated simultaneously with the organism, this resistance must be excited in the organism, and thus wrench temporally distant stimuli characters out of their futurity. This accords with developed judgments of perception. The visual and auditory stimuli are simply out there. Their physical reality is a hypothetical content springing from organic reactions and awaiting justification in actual contact. The organism spreads out its manipulatory area into an existent present by reacting to itself in the roles of the distant stimulus.

In denying the presence of physical objects in the perspectives of organisms which have no manipulatory area, I do not imply that changes including motions are not present in such perspectives as wholes. In our own consummatory experience of a melody, in which reference to a physical object is very vague though not entirely absent, the whole is essential to its parts as parts of a melody. Nor do I imply that the sensuous distance character is not yet in the experience of the animal in the sense that the future contact is not yet there, i.e., from the standpoint of the observer. I mean that there is no "now" by which it can be dated with the organism. There is no experience of simultaneity. The whole action is ahead and places the color or sound in the constantly emerging future.

There are two characteristics of perceptual experience which I have already indicated, but which I wish to again emphasize. The first of these is that perception of physical things presupposes an act that is already going on in advance of perception and is a process within which perception lies; that perception implies an inhibition of this process of movement toward or away from a distant stimulus, an inhibition that arises from the presence in the organism of alternative completions of the act; and that these tendencies are under the control of what I have termed terminal attitudes, i.e., the already excited adjustment of the organism to the contact response to the distant stimulus. The perceptual field is, then, one in which action is for the time being estopped and is favorable, therefore, to the abstraction from passage in the presence of structures which are irrelevant to passage. That such an abstraction should take place in terms of a "now," i.e., that which has the date of the organism, implies that that which is the inside of the perceptual object should be a content which has been in some sense excited within the organism. It is the assumption of what has been just stated that this has already taken place in advance of the appearance of the percept of the physical thing. The second characteristic of the perceptual situation to which I am referring is its essentially social character. By the social character of the act I mean

that the act calls out an activity in objects which is of a like character with its own. I have already referred to this as resistance, that the act calls for this resistance of things that it may itself be carried through. I have emphasized the co-operative process by which the organism maintains its balance, moves against the resistance of things, and manipulates implemental things. The resistance that it receives from things is of the same nature as that which it can excite in itself. As I have stated, this social character of the perceptual process is an abstraction from a much more concrete social attitude toward the perceptual field, such as we find in our unpremeditated attitudes of irritation or affection toward inanimate things, and which is still more evident in the conduct of primitive men and of little children. The more abstract attitude is evidently later than its concrete expression, and it is in its concrete expression that its mechanism should be studied.

I have elsewhere analyzed this mechanism and the expressions of so-called mind that arise out of it,² as it appears in human co-operative conduct, in conversation with others, in conversation with one's self, and in the significant symbol, and in the appearance of substantive meanings. What is essential to this argument in this analysis is that in human social conduct certain gestures, notably the vocal gestures, arouse in the individual who makes them a response that is of the same nature as that which they call out in those with whom they are engaged in co-operative activity. In vocal gesture, in speech, one has already indicated to one's self what one indicates to the other with whom one is conversing. One finds one's self already in the attitude of the other. It is this common response, excited in the organism, which is the inner nature both of the others and of one's self. It is a mistake to assume that the self has projected itself into the other, for the self arises as an object in the same process. Solipsism is a psychologically impossible doctrine, and psychoanalysis has abundantly shown that we can apply the same type of judgment to the perceptual self that we apply to

² See esp. *Mind, Self, and Society*.

other selves. The stuff of them all arises out of an earlier phase of the act, which is antecedent to the perceptual object whether it is the self or the other. The validity of the perceptual object awaits upon the success of the act; the self as a physical object awaits upon the resistance which the distance experience of sound or vision calls for. We pinch ourselves to be sure that we are awake, and we grasp the other to be sure that he is not a hallucination. All objects are originally social objects, but in the case of inanimate things we have abstracted from all content except the resistance which is the stuff of perceptual things, ourselves or other things. They are all in some sense hypothetical until we get them into the manipulatory field and complete the act which the distance experience initiates. While in a perceptual world the ultimate test is the handling of what we see, we stop far short of this in most tests of the reality of things. We depend upon the substantive meanings of what we see, that is, upon the universalized social responses, which implicate experimental data but do not demand them. There is the familiar illustration of the bank that remains solvent when its gold reserve is stolen as long as the theft remains undiscovered.

The perceptual object is, then, there as a distance experience whose physical reality as a resistance is of the same nature as that taking place in contact experience. In the manipulatory area it is there as a perceptual reality because it is the successful completion of the act incited by the distance stimulus. It is there as a mediate implemental object. The beginnings of the act are presupposed by this mediate field and involve an already aroused tendency to move toward or away from the distance stimulus, together with inhibition of these tendencies owing to alternative completions of the act. Beyond this mediate field of perceptual physical things lies the ultimate completion of the act in consummation, which is an experience that is referred to the perceptual object but transcends its physical perceptual character. The perceptual object is there over against the organism as a physical object. This situation is referred to as a perspective. The relationship of the perceptual

field and the organism in the perspective is social, i.e., there has been excited in the organism that response of the object which the act of the organism tends to call out. Through taking this attitude of the object, such as that of resistance, the organism is in the way of calling out its own further response to the object and thus becomes an object. In the case of objects beyond the manipulatory area this resistance comes as an implication of the other characters of the object and is therefore hypothetical, awaiting contact for its realization, but we see it as having this provisional resistance. Resistance belongs to the organism and its manipulatory area and has the temporal character of the "now." In so far, then, as the organism does take the resistant attitude of the distant object, the object is brought within the temporal phase of the "now." It is no longer temporally distant, though it continues to be spatially distant. In the perceptual world whatever is existent is in a "now" and has the resistant character of matter. It is only by an abstraction that we speak of the color or sound or fragrance of the object as existing apart from the object, or of the experiences of the organism, as in consummation. I am, of course, referring only to the perceptual world. What I am maintaining is that it is through this fundamental social process that this temporal character of the "now" is spread out into a present nature, and with this comes the separation of space and time.

I have spoken of the perspective in its relation to the individual organism, but, as I indicated at the opening of the paper, the social individual is already in a perspective which belongs to the community within which his self has arisen. He has become a self by responding to himself in the attitudes of other selves. This involves the assumption of the community attitudes where all speak with one voice in the organization of social conduct. The whole process of thinking is the inner conversation going on between this generalized other and the individual. The perspective of the individual is, therefore, that of the social act—an act which is inclusive of the act of the individual but extends beyond it. The individual in assuming the

attitude of the others assumes attitudes that are adjusted to his own particular response. In so far as these different attitudes of the others call for an identical response of his own, the organization of the social act is reflected into his act. The community speaks to him with an identical voice, but each speaks from a different standpoint, and yet these standpoints are interrelated within the co-operative social activity, and the individual in assuming the attitude of one finds himself by the character of the response implicated in the responses of the others. In this fashion the individual attains the universality of the community response, which may involve the responses of an indefinite number of individuals, and yet it is a universalized attitude which is specifically related to his individual conduct—it lies within his perspective. I wish to emphasize what I have already stated: the appearance of the self is antedated by the tendencies to take the attitudes of the others, so that the existence of the others is not a reflection of his self-experiences into other individuals. The others are not relative to his self, but his self and the others are relative to the perspective of his social organism. Whatever metaphysical difficulties the conception may present, it is one which we constantly use in biography and history. The individual and the society are selectively and causally determinative of the environment, and this determines the individual or the society—neither can be explained in terms of the other except as the other is determined by it. The attempt to proceed otherwise leads to an impossible solipsism or to an equally impossible determinism.

X

PERCEPTUAL ERROR

RECONSTRUCTION of the object in a problematic situation takes place only in so far as the stimulus which called out the wrong response, or failed to call out the expected response, calls out a successful response within the field within which the corrected action goes on. This response may be only that of ignoring the stimulus, or it may be a response which is so interrelated with other responses that the results do not interfere with continued action. It may be a social response which implies an attitude of malice on the part of the thing, or it may become so elaborated that we state the error in terms of the mechanical world in which we state the successful stimulus. Thus the bent stick in the water is stated in terms of the theory of light by which we state also the relation of objects that call out anticipated responses. In the case of the social explanation, i.e., in the attitude of primitive man, things are *en rapport* with us as they are friendly or unfriendly. We explain the mistake by the hostility of things. This amounts to stating the world of things in terms of the responses by which the error is corrected, i.e., in terms of the reconstruction of the object which allows action to continue. A magic formula enables us to continue to act even with reference to things which do not react as they should. We avoid the hostile object and seek to render it innocuous by the use of a charm. But this is possible only if we act toward all the rest of the world as if it also were friendly or unfriendly to us. The logic of physical explanation is the same. The refraction of the light ray passing through water can be the nature of the bent stick only if we find in the other facts of vision an action of light rays through other media. This statement of the phenomena in the erroneous experience involves the statement of the self within which they are placed in the same terms. In the case of the primitive man the

self is a being who is friendly or unfriendly toward the world about him, is in social relations with the world about him, and in social relations which must be acted on not only in irritation against what reacts wrongly but in constant maintenance of social connections with all things about him. This self which has in it attitudes and impulses which are counterparts of the hostile and friendly conduct of things is not the individual of immediate experience. In the self are imbedded the impulses, attitudes, memories, the social values, etc., which are not in immediate experience. The self is a social object like other social objects and is reconstructed like other objects in reflective experience. The individual is mistaken in himself as he is in others, and he states the conduct of others in terms of his own attitudes and responses. He is aware of others only in so far as they affect him. It is his own self that reflects others to him. Now there is the same break between the perceiving individual which experiences himself in relation to others and others in their relations to himself that exists between the perceiving individual and the physical organism with its physical environment. It is possible to state the whole process of mutual social stimulation and response, and still the being aware of what is taking place would not be a part of the process. In the same manner it is true that one can state the whole process of physical stimulation and response, and the so-called consciousness of this process would not be a part of the statement.

If one undertakes to introduce the consciousness of the process into the statement in terms of the organism and its environment, one finds that this so-called consciousness also would be stated in neurological terms, while back of this neurological expression of being conscious would lie another state of consciousness of this that is going on in the system. So-called consciousness appears in experience when the social or physical individual appears as an object and exists for the perceiving individual. By a metaphysical *tour de force* the perceiving individual and the individual as object may be identified; but, if one has abandoned the *tour de force de métaphysique*, one must seek some other way of stating the relationship between the per-

ceiving individual and one's physical or social self as an object. The psychologist has introduced the conception of parallelism to state, if not to account for, the situation. The process of explanation in this case is in terms of the errors of so-called sense perception. These errors refer to the indications that the contact experience called out by the distance experience would not be that which the initiated act calls for. The explanation sets up a mechanical world in which both the erroneous and the correct thing, and an individual in which both the futile and the appropriate response, have the same reality. This world is not the world within which the error has taken place, for in that world the error was not an error but an object. When an error becomes an error, abstraction is made from its former objective character, and the field is cleared for its explanation. Furthermore, the statement of the experience as an erroneous experience, in terms of its explanation, omits its objective character. The statement of the refracting medium, the rays of light, and the optic apparatus, which explains the bent stick in the water, is just as much a statement of the vision after one has learned the truth about it as it is of the experience before the error is recognized as such, that is, when the bent stick is a bent stick. The explanation of the error in further psychological terms, i.e., in terms of imagery and habitual response, does not present material which belongs to the perceiving individual. It, like the sensuous experiences, is referred to the self, i.e., to the individual as object to himself. All this material becomes subjective just in so far as its reference to the self makes possible the successful reconstruction of the fractured object.

While the metaphysical psychologist, perhaps unconsciously, is placing the occurrences in the central nervous system parallel to the experience of the perceiving individual, the actual parallelism lies between the neurological occurrences and experiences which are referred to the self in the social process of reflection. Thus the physical mechanism presents a series of phenomena that answer to the so-called sensations which are referred to the self as a social object.

The situation implied here can be best presented in a detailed analysis of an instance of perception.

The illustration already suggested is that of the recognition of error in the perception of the apparently bent stick in the water. This calls for the comparison of the stick as felt with its apparent bend as seen. The comparison is either between the anticipated bent contour and the felt contour or between the anticipated seen contour when grasping it in the water and its seen bent contour. It comes back, therefore, to a conflict between an image of the result of an act and the experienced result. There is a conflict because the experienced result calls out a different response from that which an object would have called out which was what the so-called image indicated. One acts in a different way toward a bent stick and a straight stick, in particular one acts differently toward a straight stick that can be depended upon to remain straight and one that treacherously becomes crooked when partially immersed in water. The immediate undertaking is to state the straight and the bent stick as one, in order that one may act with reference to it. This can be done only in so far as direct values for immediate experience are canceled and one can substitute for the stick of one's immediate vision an inferred object of molecular structure reflecting motions of ether that reach and influence the retinas of the eyes and so affect the central nervous system. From this standpoint the stick is the same, and its straightness and its crookedness are stated in the same terms, and one's reaction to these stimuli is stated in the same molecular terms. It is a method which inevitably puts the object and the perceiving individual in terms which are not and cannot be those of immediate experience. It leaves, therefore, the perceiving individual and his world on one side and the corresponding physical and so-called psychological states parallel to each other.

This perceiving individual and his world of immediate experience, however, is that in which this explanatory statement must find its test, if conduct is to go on. Both the physical and the psychical series are, however, referred to this individual of

immediate experience, but they cannot be stated in terms of immediate experience.

The parallelism is an expression of the relation between the erroneous perception as a fact referred to the individual—the self—and that statement of the object which abstracts from the reaction that the character of the object demanded, e.g., reaching for the bent portion of the stick in the water, and could never lie between these series and the world of immediate experience; that is, when this is undertaken—when we state that the real world is the mechanical order of corpuscles plus the stream of consciousness of the self and that the world of immediate experience is found in the latter—clearly this is conceivable only for the observation of an individual in a world which is not itself the direct subject of observation. This is a recognition of the attitude of so-called common sense. The independent reality of the physical corpuscle and of the imagery, of significant symbols, and affective contents as contents of mind, pass into the full reality of immediate experience, and in that immediate experience these elements, into which the object was analyzed when conflicts arose in its meanings, lose their independent character. The world of immediate experience is not a permanent world, nor is the assurance that comes from the experimental test one which springs from the fitting-in of the hypothesis into a structure of experience which is unchanged. It is important to recognize that the value of the experimental test lies in the fitting-in of the hypothesis into the world of conduct—the rendering of continued action possible. That such continued action implies some sort of order is no doubt true, but it is an order which may change. The world into which the hypothesis must fit is fixed in so far as the problem remains defined, but, with the change in the form of the problem or with the appearance of new problems, this world into which the hypothesis must fit changes; its permanence is relative to the immediate situation. In each situation the permanence of the world about the problem seems entirely permanent, except in so far as the problem seems to shift.

XI

PERSPECTIVE THEORY OF OBJECTS

IN A Minkowski world an organism adjusts itself to stimuli which are spatiotemporally distant from it. The distance depends on the rate of the motion of the organism and of the object. This statement in terms of motion is illegitimate, since there is in a Minkowski world no motion, as there is no permanent space, but there are varying intervals between organism and surrounding stimuli which are dependent upon the expressions of energy of the organism and the stimuli. One organism will have, then, a different environment if it develops more energy than another.

The selection of the environment that the temporal character of space makes possible is just as important as that dependent upon the sensuous susceptibilities of the organism. We overlook its fundamental nature because we reduce all the environments to terms of our own permanent space; and, in stating the environments in a Minkowski world, it is perhaps impossible to avoid this reduction, but we can abstract from its fundamental import for ourselves. A form which in our permanent space moves rapidly will relate itself to distant objects which would not lie within the purview of a form whose motion was slower. Objects which would be spatiotemporally out of reach of the latter form would be readily accessible to the former. Thus, assuming the two forms to be located in the same event, we would be in one temporal environment and the other form in another environment. In a Minkowski world there would be no present, that is, no simultaneity, except in the manipulatory field, which in the case of an animal whose immediate contacts were mainly those of position, balance, and support would be of minimal import. Rest in the experience of such an animal would be a negative reaction to the distance stimuli. There would be no

content placed in the spatiotemporally distant stimuli which would belong to the contact experiences of the animal because, if we assume imagery from past experiences, it would be of consummations, positive or negative. Furthermore, there would be no implemental content in the manipulatory or contact field of the animal. In a field of a "now" the content must be one which could be at the same phase of the act. Food which is "now" is not being consumed, but is mediatory stuff, matter, which could be at the same stage of the act as that which was reached by subdivision—which yields only new surfaces. It is evidently an experience which is conveyed from the organism, where an inside is given directly. Of course, no outside can appear as such except over against an inside. It is over against the surfaces of other things that the outside of the organism arises in experience, and then the experiences of the organism which are not in such contacts become the inside of the organism. It is a process in which the organism is bounded, and other things are bounded as well. The inside is, first of all, that effort which we denominate muscular exertion, which brings about change and activity, together with affection and intent. But nothing can be an object in experience unless action is directed toward it, and nothing is an object without the self or organism being also an object, so that the presence of an object involves not only action with reference to this object but also action directed toward the self or organism. Action of the organism with reference to itself is, then, a precondition of the appearance of an object in its experience. The striking characteristic of perceptual objects is their simultaneity, the substitution of objects which are spatially but not temporally distant from the individual for those which are spatiotemporally distant. The basis for this simultaneity is the common possession of a content which carries the character of "now." What seems to take place is the pulling of the distance stimulations out of their temporal distance from the percipient and endowing them all with the temporal character of the "now," thus rendering them all simultaneous. The mechanism for this is in some sense pro-

vided by what may be termed the terminal attitudes. These are beginnings of the contact response that will be made to the object when the object is reached. This is already excited in the organism with the sight of the object and controls the approach of the organism. It has been customary to assume that the memory image of former contacts comes in to fill out the experience. This is a dubious assumption from the standpoint of introspection, but the question here is whether such a filling would provide the element of the now. The now is contrasted with a then and implies that a background which is irrelevant to the difference between them has been secured within which the now and the then may appear. There must be banks within which the stream of time may flow. Mere imagery which filled out the distance experience would be infected with the same temporal distance as the distance experience itself. If, however, two mutually exclusive ways of seizing the object were present in the organism, two different terminal attitudes which inhibited the approach, the organism might try them out over against each other in imagination if it could wrench them out of their temporal distance and make them simply extensions of the manipulatory area. In the characters which remain unchanged in the process there would be a timeless situation within which the process could go on and which would provide the conditions for the competing acts.

The achievement of the human animal, or rather of human social conduct, is the arrest of passage, and the establishment of a "now." It takes place, as indicated above, by inhibition first of all, but inhibition is not competent to erect the now, i.e., a world within which passage can take place, and hence a world which is irrelevant to passage as regards its structure; and, in the second place, a world in which the temporal character of the manipulatory present is extended indefinitely, i.e., in which what is spatiotemporally distant is given the character of that which is both seen and grasped, is one in which both promise and fulfilment are given. Actually only the promise is given in the distance experience and any imagery of contact would still

be spatiotemporally distant—the contact if this is given in tactual imagery would be a past content put into a future experience. To reach a now, involves putting the temporal character of the organism in the manipulatory area over against a then. To pull all the distant stimuli into such a now requires getting an experience of the organism which belongs to the manipulatory area into these stimuli. The content must be one of content which is the fulfilment of the act, and yet it must be one that is identified with the organism in its immediate activity which is essential to the now. Such an element is found in the resistance which the organism offers. If the organism can play the part of the object in resisting the organism, if the organism can play both parts (that of resisting the object as organism and of resisting the organism as object), the now of the immediate activity of the organism can be put into the world of distant stimuli. To accomplish this, the organism must stimulate itself to act as the object by its response to the stimulus of the distant object.

The character of the now attaches to the immediate reaction of the organism, in so far as the act can be completed, in response to a distant stimulus by contact reaction. If only the stimulation by a distant stimulus is present, it attaches to the incompleted act and has therefore the coefficient of the future. This will also attach to any mere imagery which is fused with the distant stimulus. In some fashion the organism must be in the attitude of reacting in contact fashion to the distant stimulus if it is to be brought into the now. The memory image will not induce this reaction; it comes with the character of the past, not of the present. All reactions in the now are to selected stimuli which call for a response on the part of the object which is required for the completed reaction. One appeals to the environment for the response that is needed. In inhibition owing to competing responses, the terminal attitudes call for tentative reactions of the objects which will lead to readjustment of the complex response which overcomes the obstacle in the situation. One imaginatively tries out various combinations, demanding

therefore a content of the object in contact terms which is in some sense under the control of the organism. Mere passive imagery does not meet this requirement. It must be the resistance which the organism itself innervates if it is to meet this requirement.

Such a process is evidently one that is presupposed by the self and the objects that appear in experience, as they are in some sense constituted by the process. It is not the self that takes the role of the physical object, but certain of the initiated responses of the organism, such as go to make up the self, do go to make up the object, and these responses are excited by the terminal attitudes of the organism.

The peculiar importance of this origin of the content of the physical object lies in the occasion that it offers for the appearance of the self as an object. In the content of resistance which goes into the chair seen at a distance the organism is inviting itself to sit down in the chair. It is the inside of the object that reveals the action of the organism in the content of the object, and it is this which is not given in the distance or passive tactual experience. It can have no other source except the resistance as given in the initiation of the response of the organism itself and which, in so far as it is inside the object, dates it with the organism in the now. If the stimulus to this reaction lies in the object it would have the future date of that stimulus. Only if the stimulus lies in the organism itself can it be in the now, and so be simultaneous with the organism. It is a reflection of the organism into the environment. This can only take place in an organism in which the whole determines the parts, where an identity of the content of the whole and the part is given.

The objects that are there in independence of the organism imply the organism. That is, the organism is not independent of them. That the organism may be an object, they must be what they are. It must be possible to regard the organism from the standpoint of its field so that it may be there as an object. The process by which the organism has arisen is, however, one in which the organism has determined its field by its susceptibil-

ities and responses. There is a mutual interdependence of the two. This is expressed in the term "perspective." In biology the dependence of the organism upon its field has been the dominant standpoint, but the conception of evolution has introduced the dependence, though by the back door, of the survival of the fit. This conception so conceived has stated the organism entirely in terms of the environment. However, this overlooks the fact that the environment is a selection which is dependent upon the living form. There is a double statement involved. The environment can be regarded as simply a group of physical particles arbitrarily selected from the whole congery of particles that make up the universe, so that the occurrences in the environment in its interaction with the form are conceived not in terms of the life of the form or the selective relationship of the form to the environment but in purely physicochemical terms. Or the reality of the form and consequently of the environment as such may be regarded as effective in the nature with which science is occupied. There is a remarkable degree of success attained by the physical sciences in predicting results on the basis of the first assumption, an assumption which just places the realities of biological and so-called conscious experience entirely in the consciousness of certain living forms. From the standpoint of the physical sciences an animal as an animal would be found solely in the feelings of the animal and in the thought and interest of the so-called conscious beings who regarded it. Beyond this, living processes would be solely a redistribution of physical particles, certain of which we would arbitrarily call life, i.e., arbitrarily from the standpoint of the physical things with which the physical sciences are occupied. Such a scientific statement, however, is in terms of a distribution of physical particles at an instant—an ideal situation that does not exist, though the approach to it in the formulations of science gives us the basis for the statement of the laws of nature. The statement ignores passage. Its statement of passage is of a series of such instantaneous spreads of nature, which can be brought as close to one another as is desired. Such a series im-

plies a determined succession of events, and this implies a definite selection of events which are simultaneous. If there are different simultaneities, there will be different successions. The assumption of science with its absolute space and time has been that there is only one simultaneity and, consequently, only one succession. But realities which involve passage for their expression do not admit of reduction to instantaneous distributions of particles, and the abandonment of absolute space and time removes the necessity of a single succession. There arise, therefore, perspectives not only in respect to the sense susceptibilities of different organisms, and to their spatial relations, but also in respect to the simultaneities which the organisms select and hence to the succession of events.

The conception of a world that is independent of any organism is one that is without perspectives. There would be no environments. There would be no objects except physical particles, for every other object involves abstraction from relations which are as real as those in the object and in the environment, and the only ground for such abstraction can be found in the attitude of some organism or structure which maintains itself through a patience of the world to that structure. But that it should be a structure implies that an abstraction has already taken place. The physical sciences in positing such a reality of the world as its ultimate reality relegated all objects except physical particles to the effects of these physical particles upon consciousness. The reply of transcendental idealism was to relegate the physical world to consciousness. It was, however, unable to make physical science a part of its philosophy of mind. Biology has forced organisms into the field of science, and with the animal organism has gone the mind. Philosophy has steadily been working since then to take back the so-called contents of consciousness into the world. It cannot be done in the Aristotelian fashion. It can only be accomplished by recognizing the principle of the perspective, that the object exists in its relation to the aspects of the world to which it is related—the form and its environment.

XII

THE RELATIVITY OF OBJECTS

IN A passing world objects do not pass. In so far as the object is spatially defined, it does not pass if it keeps the same spatial content, as determined by its reference to some percipient event, or individual, in a consentient set,¹ or if it retains the same form with a different spatial content, as in the case of a wave. If a like spatial form is continually occupied by characters that do not pass, such as hardness or color, we conceive of it as occupied by a something, a matter. The form within a consentient set is determined by reference to a percipient individual. This determination takes place through the sensuous experience of the individual. The physical object is one that retains the same character of the effective occupation of space within the range of manipulation. This involves a sphere of distance from the individual which is within the range of continual contact. The hand is the organ which is the determining factor within this sphere. Through vision there arises an experience of form that varies but slightly within this sphere, or, if it does vary, the implications of the variation in terms of contact are readily perceived. A certain form, such as the circular form which is revealed by contact, is always to be secured by giving the object a certain set of positions. The perspectives of vision can always be reduced to a standard set by movements of the object. The object appears most fully in experience when the contacts of all its surfaces enter into experience at once, as in manipulation. Our distance experience of physical things implies a constant perception of the distant object in its reference to the experience of it in this position of normal manipulation.

¹ Probably Mead took the term "consentient set" from Whitehead's writings (see *The Principles of Natural Knowledge* [Cambridge, 1919], pp. 31 ff.) In general, a consentient set of events is comprised of all events within a common space, i.e., with reference to the sun, all of its planets are members of the same consentient set.

This implies the plotting of the space of a consentient set in terms of the co-ordinates of this normal manipulatory area.

The plotting of the object in terms of the co-ordinates of the manipulatory sphere may lead to objects which are largely identical for individuals whose spheres are at varying distances from the object. The spatial perspectives will vary greatly in vision, but their perceptual reduction to the co-ordinates of these manipulatory spheres will yield a uniformity of outline and surface. This is also true if we assume that the individuals are moving with reference to one another with anything but great velocities. That is, the object which one person in a train sees and the same object as seen by one outside the train may be identical for the two individuals when seen in terms of their manipulation of the objects. They see the same trees and stones. What will not be the same for the two individuals will be the motion and rest of the objects. All the bodies at rest for the man outside the train will be in motion for the man within the train, and vice versa. And objects moving for the man outside the train will be objects moving at different velocities, in some cases with different directions, and in the case of the same velocity and direction, at rest for the man in the train. If the velocity should approach that of light, the object seen by the two individuals would vary in diameter in the direction of the motion. That is, events which are contemporaneous for one individual will not be contemporaneous for the other. Two events, one at each end of the car, happening contemporaneously for the traveler, would not be absolutely contemporaneous for the observer outside the train, if we recognize the finite velocity of light and assume a power of discrimination equal to distinguishing the differences involved. If the velocity of light were infinite, these differences would not appear. As the velocity of light is finite, the wave which leaves one object falling at one end of the train would reach the outside observer sooner or later than the light wave from the object at the other end of the car because the distance will be shorter or longer between his eye and the object in question than it will be for the man in the

train, where the distance between the object and the traveler does not change. As the light waves from the two objects, which fall simultaneously for the man in the train, have to travel over distances which, when they reach his eyes, will have been rendered different by the movement of the train for the man outside the train, the fall of the two objects will not be simultaneous for this man. The perception of objects at a distance would then be of objects of manipulation which would vary for the two individuals if they were moving with reference to each other at very high velocities. It is also evident that, if contemporaneities varied in extents of time, time intervals would also differ. While these differences would be perceptible only in case of high velocities, they are involved in any case of the movement of what may be called the consentient sets of two individuals with reference to each other. While we are able to perceive objects differing in spatial perspectives as identical in size if they are so identical in the manipulatory spheres, we would not be able so to see them under the same temporal perspectives if our perceptions were quick enough to catch the variations which temporal perspectives introduce.

This fact is of importance in making evident that the spatio-temporal dimensions of objects in one consentient set are not the same as in another, the assumption being that different consentient sets are moving with reference to one another. As a consentient set is determined only by the persistent relation of here and there with reference to a percipient individual, we see that the outlines and physical characters of objects vary with reference to the individual and that these differences belong to the physical worlds within which the individuals exist, not to an experience which can be abstracted from this world. The physical objects are determined in their objective character, in the character with which science deals, by their relations to the percipient individual. For the differences of temporal perspective affect not only the outlines and surfaces of objects and the intervals between their happenings but also their mass or inertia. There exist, then, objective worlds which are relative

to individuals, if we are willing to recognize temporal perspectives owing to movement of different consentient sets with reference to one another. If we assume an absolute space, with, say, the co-ordinates of the so-called fixed stars, these different worlds will be reduced to a real world with identical objects and identical time intervals, of which these different worlds will be but subjective pictures. Abandoning an absolute space, there are no absolute dimensions and physical characters of objects. In an absolute space it would be obviously impossible that an object should have different dimensions simply because it has that appearance to observers who observe it under different conditions of motion and rest. Its real dimensions would be those which it had in an absolute space, and the intervals which lay between its changes would be those which the absolute distances between objects in that space measured. The rising of the sun and the going-down thereof could be but the mistaken perception of the motion of the earth. These two sets cannot both be real in the same absolute space. If, however, there is no such absolute space and time, but only the spaces and times of different consentient sets answering to the percipients who determine these, then these different worlds can be no longer referred to an absolute world.

If we recognize that, instead of space being static, what we call the space of our world is passing as well as its events, then the seeming impossibility of the same things belonging to two different spatial orders disappears. What is meant by space passing is that its points are recognized as routes which from the standpoint of another consentient set become lines in that set. From the standpoint of the co-ordinates of the fixed stars, every point which is determined on the surface of the earth is a route which has become a line, and lines have become surfaces, and surfaces volumes. When it is recognized that there is no system of co-ordinates which is absolute, then there is no point that is anything more than the assembling of a series of positions which from one standpoint may all be regarded as one position, while from any one of an indefinite number of standpoints they

may be regarded as lying differently in one of the three-way spreads of extension. Adopting for the moment the conception of instantaneousness, and considering simply spatial perspectives, the line between the individual and a distant point is itself a point. The line may be conceived of as the locus of an infinite number of events stretching from the individual to the point in question. The perspective reduces them to a single event-particle. If the perspective is shifted, and one stands to one side, the point becomes a line of varying extent as one comes to take a position that is closer and closer to that of perpendicularity to the line.

If one moves about in a circle from the original position of the individual to the point which was the object of vision, the line in question would not only increase in length up to a maximum at the point of perpendicularity, and then would decrease again in length, reaching a point again when the individual occupied what had been the point of vision and envisaged the point which he had occupied at first, but also the line would be at an angle which would vary through all the 180 degrees. It would also be on the left of the individual if he were moving to the right, while the line would have been on the right if he had moved to the left about the same circle. If we assume that the up-and-down co-ordinate is determined by the longitudinal axis of the individual in question, then a movement in a circle in the plane of that axis of the organism would give to the line every possible degree of angularity to the co-ordinate, from horizontality to uprightness. As the assumption is that of instantaneity, the presentation of motion is paradoxical. What is involved, however, is merely that one should conceive of one's self at the instant as being at any one of the points which such a motion is conceived as passing through.

It is obvious that a visual, or distant, object, which is made up of visual elements, may be indefinitely distorted by the occupation of these different positions in an instantaneous space. It is, however, the nature of our percepts that they can exist with the values of the manipulatory sphere, that is, that we can see

them with the dimensions they would have if they were brought within the field in which we could both handle and see them. In this sphere it is the manipulatory experience that determines the dimensions, and we see those visual characters as the real characters of the object which we see when we are manipulating the object. The laws of projective geometry express the rational character of space, which makes this translation of the distant dimensions into those of the manipulatory sphere possible. These so-called distortions are only distortions in so far as we have present the visual form both at a distance and in the manipulatory sphere. Otherwise the visual form at a distance is the percept at a distance and would be a distortion if seen with the values of the manipulatory sphere, e.g., if we see a distant object through a telescope. The location of objects seen in a mirror and their forms seen through refracting mediums are instances of the so-called errors of perception, which involve the comparison of the visual, or distance, form with that of the manipulatory sphere. When, then, we state that we see objects as having the forms of the manipulatory sphere, we imply such a comparison, unless we are referring to the attitudes which we take toward the distant objects. These attitudes are those which, if carried out into overt action, would lead to movements which, if persevered in, would overcome the distances and bring the objects into the manipulatory sphere. The result of the act implied in the attitude is compared with the immediate experience. This may take place in experience, but it is not necessary to perception, nor does it ordinarily characterize our perception. What is characteristic of ordinary perception is the adjustment of the organism with reference to the distance field, which makes normal conduct in that field possible. This adjustment leads in conduct to the results to which I have referred. They need not be in experience in this form of imagery, though they can appear at any instant in which they become of assistance in controlling conduct.

What is of importance, in considering the situation, is the fact that, in bringing in this actual or possible comparison, we

are deserting our instantaneous space, for it is only in the actual, or imagined, or conceived accomplishment of the act that the comparison can take place. When we do this, we prolong the instantaneous space beyond the hypothetical instant. In the instantaneous space there is and can be no error, for even the presence of the imagery of the distant object at the instant in the experience implies the completion of the act, and this involves time. Imagery is, of course, present in perception, but in so far as the immediate attitude is concerned it lies in the distant object with its appropriate perspective. The object filled out with imagery is still a distant object. In correcting the perception of the object seen in a mirror, or when partially immersed in water, we make a comparison. We do not immediately see the object behind us, nor do we see a straight stick. It is the assumption of such a comparison that the instantaneous space persists, or, at least, if the space of the instant has passed on, that those which succeed it are identical with it in respect to their relations to the individual and the objects in his perception.

This assumption not only is borne out in our everyday conduct but also has been borne out in scientific observation up to a relatively recent period. As I pointed out earlier, it would not be borne out in immediate experience if we were moving relatively to other things and their consentient sets with high velocities and were able to perceive objects passing us with these enormous velocities. The situation would be analogous to that of the mirror object or of that of the stick partially immersed in water. We would see one thing and have to correct the perception by past experience to get the other, i.e., the object as it would exist in our manipulatory sphere; and, when we so corrected it, we would be obliged to recognize that the spatio-temporal relations of the objects moving with the high velocity were not identical with those of our so-called instantaneous space. That is, we would see things with dimensions which would have a meaning for our manipulatory spheres which would not be borne out by the experience of getting them into those spheres. And we could not translate these errors into laws

of reflection and refraction which implied a static space within which the mirror and the water image exist. We can get these images and the objects in their proper places into the same space; we could not do this with the objects observed moving at these high velocities. With the proper Lorentz transformations, we could translate from the one situation to the other, but they would remain objects in different time-space systems. We would never be able to get them into the same perceptual world as we understand this in the case of the so-called errors of perception.

XIII

PERCEPTION AND THE SPATIOTEMPORAL

THE spaces and times of perspectives arise within a perceptual world. The temporal distance of the visual object and the nervous system of the organism are determined within a permanent space of the perspective or time system which is secured by an approach to a spread of nature that has no temporal thickness and then is given the endurance of patterns of enduring objects. This involves the extension of the manipulatory area with its congruence of the contact and the distance characters of things so that a like congruence appears to exist at a distance. That is, we give to the hypothetical contact object at a distance the data of the manipulatory area, while the date that belongs to it is that of achieved act. If the contact object at a distance is contemporaneous with the manipulatory area, then the connection between the distance area and the manipulatory area must be of the contact type, and the temporal distance is attained by ascribing the visual character to a previous moment of the contact object. A future object that is present must be the future of a past object. If we compress the anticipated world into the present, we force its temporal distances backward. Our conduct implies a set of contact processes which bring about a future anticipated contact experience. If that anticipated contact experience be postulated as now existing, it must have been an earlier world that was responsible for its distance or future characters.

The world about us is a set of ends to be reached or avoided, and the spatiotemporal distance of the ends is organized in perception as the means by which these ends may be so reached or avoided.

There are two worlds involved in the interpretation which we give of perception. The distant object has a reality which waits

upon the completion of the act. It lies in the future, but it is a future which is merely an extension of the so-called specious present. It belongs to a world in passage. The future will be, but what it will be is only partially certain. In passage the forward portion is always in some degree precarious. What is happening is certain, and this certainty attaches in especial degree to the portion of the specious present which is the immediate past and to the extension of the specious present backward into memory and history. In this field there is uncertainty as to what has happened, but something has happened. The uncertainty attaches to the success of the discovery. As to the future the uncertainty attaches also to what will happen, though this uncertainty can be reduced in a measure. It is the field of probability. It is of the nature of the future that this uncertainty can never be entirely removed.

The other world is that which science exploits, that in which the specious present is reduced in its temporal dimension, by attaching itself to the enduring factors in experience to which passage is irrelevant because of the rhythmic recurrence of their patterns. In this world we approach but never reach events which do not happen but simply are. We go from one supposititious instant to another either by an immediate leap or by the indefinite number of steppingstones of interspersed instants. This gives a view of the world as made up of such moments and, therefore, as having the certainty of that which eternally is. It removes theoretically the uncertainty of the future. This is inevitably the world of the manipulatory area, in which the distance experience of vision is immediately realized in contact. In the collapsed act the future and the past of the specious present are merged in a timeless present. In experience the characters which endure, and are therefore irrelevant to passage, are the contact characters. While every change of position varies the distance characters, the contact characters continue congruent with themselves, though we use the nicer discriminations of the eye to define these congruences. They possess, then, both features, congruency with themselves over against passage

and the reality promised by distance experience. They are enduring reality.

The exploitation of this field by exact science is made possible by its technique. The aims of this technique are twofold. It seeks to render exact the enduring patterns and to find definable boundaries for a minimal passage of any required degree of temporal thinness. The ideal limit of this technique is the distribution of mass or energy particles in the universe at an instant. Ancient science met the first of these aims by its geometry, by the analysis of all cosmical changes into the movements of bodies with uniform velocities in circular orbits, and by the analysis of mechanical situations on the earth, so far as they studied them, into states of conceivable equilibrium. This made geometry an adequate technique for the exact determination of enduring patterns. The other aim of exact science, ancient science met not by "the law of convergence by diminution of extent," though the first steps toward such a theory were taken by Archimedes, but by finding the reality of the perceptual world not in the contact experience of the manipulatory area (with the exception of Democritus and the other atomists) but in a realm of timeless essences reached by a process of logical abstraction. The timeless reality of the world, then, was found not in the world at an instant but in a logical conspectus of the world in which one could abstract from all change.

The timeless reality of the object which ancient science seized upon is a substitute for the contact content of the percept. This latter it rejected in rejecting the doctrine of the atomists. It rejected the atomistic analysis because this sacrificed the meanings of objects, as ancient science saw no way of stating the meanings of distant objects in terms of contact experience, in other words, in terms of matter. Modern thought after the Renaissance accomplished this by transferring the meaning of the object to consciousness and in the discovery of a conceivably complete correspondence between these meanings and the atomic structure and changes of things. The necessity of a timeless, as distinct from an eternal, reality of the object

is involved in all deliberation or reflection. Action is for the moment stopped, and successful future action is dependent upon the discovery of what endures both in the structure and in the processes of nature as the basis for a plan of action. The problems out of which ancient philosophy arose were dialectical rather than mechanical. The ancient world did not assume that it could solve its problems or assist in their solution by changing its physical environment and appliances. Its solutions were sought instead in the analysis and reconstruction of men's ideas, of the meanings of things. It sought, therefore, for the permanences among these meanings. Out of the accepted presuppositions of argument or dialectic arose the ancient idealisms. From the time of the Renaissance modern thought has turned with growing interest from a fixed order based upon accepted meanings to the development and improvement of the order of things through the reconstruction of the meanings of things. The method of that reconstruction has been found in the perfection and improvement of the means and appliances by which meanings are attained. This has led to the restatement of meanings in terms of means rather than dialectical entities and has, therefore, stimulated the discovery of the enduring factors in the structure and changes of the environment and the mechanisms of conduct; and it became possible to state the reality of the percept in terms of contact experience with a corresponding meaning resting for the time in men's minds or consciousness. Science could revert to the perceptual world and find its reality in the contact import of the distance characters of things, that is, in their effective occupation of a relatively permanent space, and could analyze change or motion into a series of moments each of which could be conceived of as approaching as close to an instant as might be desired.

It is reflection that seizes upon endurance to ignore passage and, in respect to that which does not change, to find a permanent field for the determination of possible alternative courses of action. Passage awaits upon the action to come, while the individual persists in an environment that is irrelevant

to time. Human experience thus takes place in pulses. It strings together these permanent environments into a permanent space lying in a time series which is abstracted from it. Science introduces order into this series of pulses by reducing them to a series of moments without a temporal spread. A specious present is such a pulse, which science reduces to a knife-edge present.

Over against such a series of moments stands the passage of nature in unreflective experience and surrounding it. In the reflective experience reality is the congruence of the distance and contact values in the manipulatory area—both the promise and its fulfilment are given together. This type of reality is extended in the reflective ideal of the world at an instant. If the manipulatory area can be extended, there can be the same type of reality everywhere, but only upon the assumption of its existing at an instant, for an instant is that moment in which the whole act is collapsed, and one handles what one sees. In so far as what one handles endures, one can ignore the passage between the seeing and the handling. If the pattern of the contact experience is irrelevant to passage, one can assimilate the spatio-temporally distant to its achievement in contact and assume a real world existing at a moment. Into the world of passage we extend the manipulatory area with its relative permanencies as the basis for conduct. The passage of these permanencies is irrelevant and seems to present a spatial order which is timeless. Within the timeless space passage is abstracted by its irrelevance to the permanent and becomes a passage that is not the passage of anything, i e., abstract time. In the abstract space and time we plot the motions and changes that go on and determine what shall be our action. However, outside the ground upon which we stand and the reach of the hand, this extended manipulatory world is hypothetical. Directly and indirectly this hypothesis is constantly proved correct, though in the details of judgment of distance and the size and mass of objects it is subject to frequent correction, but at bottom it remains

only a working hypothesis. Of course, the atomic structure of matter remains still more evidently a hypothetical structure.

On the other hand, distant objects are there in the world of passage as distant objects. Exactly where they are in the world at an instant in the extension of the manipulatory area, and just what their perceptual reality will turn out to be, is hypothetical and awaits direct or indirect test. We live so constantly in the world of our reflective moments, with the implications of science that its extension can be reduced to a permanent space and an abstract time, that it is only with difficulty that we can capture this world of passage. We see objects as having the resistance of contact and the location assured by the measuring rod. Even when we see objects back of the mirror, we see them located and resistant and have to correct the perception by a further judgment.

We think in a permanent space, from which the passage of the space and its enduring objects are abstracted. The reality of the perceptual object in this milieu is given in the manipulatory area. It is hypothetically given beyond this area by its extension, so that the object at a distance has the hypothetical contact value at the instant of the manipulatory area. In unreflective experience, when one runs to catch a car and, in general, must act without thinking, the whole field of action is passing, and the reality of the distant object lies ahead of one in time as well as in space. The field of action is time-space, an extension that is passing. In this experience we do not present hypotheses, for these are formed on the basis of present existences. In the anguished grasping at the stem of a sapling as one catches one's self in slipping on a cliff the reality of the sapling is entirely ahead. There is no time for estimate, one must continually act. Minkowski brings us back to a type of experience which the whole character of our training has pushed into those infrequent corners of action, when we cannot stop to think even for an instant. Back of most of our action, even in hurried action, lies a world that hypothetically endures both in its structure and in

its rhythms of recurrence. However headlong the motion, we must capture the whole field as it must be assumed to be at the instant to exercise our proper intelligence. "Stop and think" is the ceaseless admonition delivered to impulsive childhood and adventurous youth. The failure of maturity to understand precipitate youth lies in an unquestioned assumption that youth must have formed some idea of what it was doing, that it must have seized the future as at present existing in terms of the enduring realities of tested experience. The puzzled question is, "What could he have been thinking of?" And the answer is, "He was not thinking." One cannot think in a perceptual world of space-time. Its geometry can only be constructed by abstract symbols.

Thinking or reflection, then, is a procedure by which the recurrence of identical or similar patterns comes to endure in a passage that is abstracted from them as time. It is, of course, evident that the import of reflection is not confined to the individual organism. Without a permanent space and an abstracted time, motion would not exist as a determinable process. Permanent spaces and abstract time are most familiar facts of our environments. The abstraction from passage because of the irrelevancy of passage to enduring objects does not exist alone in a mental or subjective process. It is actually present in the nature of our environments, for certainly motion is one of the most unquestionable of the facts of nature; and yet the familiar identification of the point under the pencil of a man in an airplane and the line which the endurance of that point constitutes in the field through which the airplane is passing, or the different spaces through which the sun travels from its rising to the going-down thereof and that within which the world revolves upon its axis, make evident that a permanent space is not only not independent of the percipient events or individuals that inhabit them but that it exists only in relation to them—yet it does not exist within them. On the contrary, they exist within it. The causal relation in nature of the environment to any structure which maintains itself within it has been always recognized;

the corresponding logical determination of nature in the environment by the structure has not been recognized as a feature of nature. It has been regarded as a mental abstraction.

If this account is true, reflection is a fact in nature and not simply in mind. For motion, and the permanent space and the abstract time which it involves, are facts in nature, and permanent space and time abstracted from passage exist only as the conduct of the individual is checked. They exist in nature in the perspective of the individual, and the individual exists in the same perspective. No one would, of course, deny that the logical relationships between the individual and his environment exist; what does seem strange is the assertion that nature in these relations so stands out in detachment from other connections that the environment has the same reality in nature that it has in experience. In a certain locality we mark out the different environments of different forms of animal and vegetable life. It is natural to assume that the whole locality with all its objects, presented from the standpoint of a descriptive science, is nature, while the separate demarcations of the environments of the different forms that intersect one another are abstractions which our thought makes in following out the life-processes of the different plants and animals. So in the past we have taken the space of the co-ordinates of the fixed stars as the fact in nature and have taken the spaces of the earth man, and of the man on Mars or on the sun, as individual deformations of this, as the lines of a railway track meeting at the horizon are in some sense a deformation of the parallel rails at a constant distance from each other. It appears so to the individual, but in nature these perspectives dependent upon the individual are replaced by a world in which these aspects of the world are all ironed out. But there are no fixed stars, and the space which answers to what seem fixed is but another perspective within which we place ourselves as we do in that of the sun or of Mars for different purposes. Locating ourselves in one does not relegate the others to a field either of subjectivity or of unreal abstraction.

This brings us to the unique characteristic of the human individual—that he can place himself in different perspectives. Thus, when a train moves beside his own, he can place himself in the perspective of that train, or he can remain in that of his own and see the other train move away from him. He can take the perspective of the descriptive scientist who presents the whole locality from a geologic standpoint, or place himself at the point of view of an individual plant or animal and see the world in terms of its life-process. And he can in a manner maintain himself in a number of perspectives, though in this case abstraction in the sense used above, derogatory to detached reality, appears. The descriptive scientist regards nature as the whole locality, while the environments of different plants and animals represent only lines drawn within this; and in plotting eclipses the astronomer reduces the perspective of the observer to the perspective of the man on the sun, or in plotting the path of the sun to the perspective of the co-ordinates of the fixed stars. In the case of the man in a train beside which another commences to move, the man may actually be now in one perspective and now in the other without placing himself in the perspective of the station and so translating to either. In that case he does not necessarily occupy a reflective attitude. In the reflective attitude he can regard himself as moving or at rest.

Reflection involves the assumption of different attitudes with the consequent different perspectives that answer to these different attitudes, but in reflection these attitudes are present not in full perceptual form. They are present in abstraction. In the case just cited of the man in the train, he is now moving and now he is not moving, perceptually. If he places himself in the perspective of the station, he reflectively can regard his train as moving or at rest, but, if he thinks it, he does not perceive it. We cannot perceptually remove ourselves from the geocentric perspective, but in thought we live in a heliocentric solar system. In the perceptual perspective there lies a group of objects which have such a relation that they are, to use Whitehead's phrase, cogredient with a percipient event, or the

percipient event is cogredient with them. The perceptual expression of this is that they are at rest. It is only with reference to a percipient event, or at least to some structure which figures in the role of the percipient event, that such a group can be said to exist, and yet it has relations which are independent of the percipient event. The character of the environment of an animal or plant may be such that it can become the environment of a society of plants and animals. A notable illustration of this is found in the interweaving of flowering plants and insects. Furthermore, the perspective is that within which the percipient event exists. The perspective does not exist in the percipient event. While the actual range of relations between the percipient event and its perspective or environment set boundaries to the field of the perception and action of the percipient event, and so to their actual interrelation in conduct, the spatiotemporal relations themselves always extend beyond any such factual boundaries and theoretically extend indefinitely, including all events. Thus the events which belong in one perspective belong also in all the others, but they have different logical relations in the different perspectives. Thus objects which in one perspective are at rest are in motion in others. In such a situation the fact that the events or the objects which occupy them also have places in another perspective can have no import in the perspective in question. That in the perspective of Mars the earth is revolving can have no import in the perceptual world of the earth. But where two or more perspectives are interwoven, as in the case of those of insects and flowering plants, the difference of logical order of the events in the two or more perspectives has a causal import. Assume that two systems are moving with reference to each other. It is a matter of indifference whether we speak of one system as moving or the other. The same laws of mechanics are expressed in the account which is given of the relative changes on either assumption. In the case of the environments of the plant and of the insect, it is essential to the life of each that the events which lie in the environment of both should have the import

that they have in each in order that they may have their proper import in the environment of the other. That is, there is an environment which includes the environment of both, a perspective that includes the perspectives of both. In the case of the plant (assuming it to be a percipient event) and of the insect, their perceptual perspectives would not reveal this relation, but in the perspective of the man who introduces wasps to fertilize fig-tree flowers the perspectives or environments are so interwoven. The perspective of the wasp intersecting the perspective of the fig tree introduces into this perspective the dimension of fertilized fruit and successful reproduction.

There seem, then, to be two conditions that must be present if two or more perspectives are to so intersect each other that what belongs to the order of one shall affect what belongs to the order of another perspective. The different perspectives must belong to a common perspective, and the percipient event of this common perspective must be able to place itself in the perspectives of the intersecting perspectives. I am referring here to perceptual perspectives. It is only in the perspective of the cultivator of the fig-tree orchard or of the scientist that trees reach their fruitage through the action of the wasps. In this perspective the life of the fruit tree and that of the wasp is each present in its essential details, and the influence of each upon the other is present in the interest in the fruiting trees. In the perspective of the wasp and in that of the fig tree, there are certain events which not only appear in both but whose identity is essential to the particular succession of events which we call the life-histories of the wasp and of the fig tree. The honey in the flower of the fig tree and the pollen which the wasp brings upon its body identify these occupied events of their two lives. They constitute an intersection of these two perspectives. They constitute a sort of plane of events which is identical in the two perspectives. The events that precede and succeed the identical events in the two perspectives do not coincide. The succession in the fig tree is the fertilization of the flower, that in the wasp is the digestion of the honey. The two histories intersect in this

one plane of events and must intersect if the histories are to be carried out in perfected fruit and in the preservation of the wasps through the honey that the flowers provide. The perceptual perspective of each runs its own course. Even a perceiving fig tree could not so enter into the life-history of the wasp that it could find the succession of events in the wasp's life-history a place in its own. But in the reflective perspective of the man who plants the fig trees and insures the presence of the wasps, both life-histories run their courses, and their intersection provides a dimension from which their interconnection maintains their species. For this reflective perspective the fig tree and the wasp as species endure. It is not a passage of event to event but a framework of enduring patterns within which passage takes place, and within which passage may take place in many directions and along many routes.

It has been already noticed that a cogredience signifies so much as rest, and in the ceaseless passage of events rest is the sole import of endurance. In space-time the most persistent of patterns is still passing, even if it continually repeats itself. If this repetition be stiffened into unchanging existence, it is because the percipient event in a series of events that remain unchanged for it finds in this scene the possibility of various alternative activities, each one of which will present a different perspective, though they all lie within a spatial pattern whose endurance abstracts from the passage they involve. The percipient event finds in a permanent space the condition for mapping out among different possibilities a plan of action.

It is only in the attitude of reflection that a permanent space appears. And the attitude of reflection is that in which the percipient event, the individual, is an object to itself. A permanent space is that of the manipulatory area, hypothetically extended. In the manipulatory area, as we have seen, passage as it appears in the act is condensed into existing reality. What we see as stimulus to reaction is present in the completion of the act, in contact. It provides the field of physical objects. But the physical object provides more than contact: it offers resistance and,

in so doing, provides the *locus standi* of the organism, the situation from which the organism acts. Rest means support, the response on the part of the area to the resistance of the organism. Such a field is the precondition of the action of the organism. It offers resistance, and resistance equals a certain pressure of the organism, of the ground or floor to the foot, of the chair or the bed to the sitting or recumbent body. We invite this resistance by the pressure of the organism or its different members. It is what Whitehead denominates the "pushiness" of things. We invite the same sort of resistance by the pressure of the hands against each other, or of different parts of the body against itself.

There is, of course, the critical difference between the pressure of hands against each other, and that of the stone against the hand: that in the case of the pressure of the hands against each other there is the sense of effort in each hand, while in the case of the stone there is only the sense of resistance in the stone against the pressing hand. However, the resistance remains an identical content of the two. Furthermore, the resistance of the hand arises only over against that of the stone. The stone defines the hand as necessarily as the hand the hand. It is a fundamental experience in which each object involves the other. It is that from which geometrical congruence is abstracted. Each surface, that of the hand and that of the stone, is given as immediately as the other, and the resistance of the one is given as immediately as that of the other. The abstraction of it in physical science is inertia. Out of the experience arise the physical thing and the organism. Neither is prior. They mutually bound each other. The illusions of contact are the exceptions that prove the rule. The critical difference of the sense of effort gives the hand an "inside" which primarily belongs only to the hand. It is in the invitation to resistance when we put the shoulder to the wheel or grip the object to steady ourselves or heave it over that the object acquires an inside which is in a sense transferred from the organism to the object. As above indicated, the pressure of the two hands against each other

offers the sort of experience from which this transfer is made, but the transfer calls for more than such an experience.

The situation out of which this transfer arises is the co-operation of resistances offered by physical things to the organism and by the organism to physical things. Human posture in any position involves it. Manipulation of any sort is an expression of it. The floors and stairs of our buildings, the forms of our articles of furniture, and the handles of everything that we handle are but elaborations of it. It is impossible to exaggerate the fundamental nature of this co-operation of the human animal with his contact environment or his dependence upon it. He rests upon it, demands and beseeches it in every position and at every step. The solid earth is dependable, the bog is treacherous, the shaft or haft is inviting to the hand, and the balance of the weapon or tool is companionable. But this social attitude transcends the nice and even comfortable adjustment of every living thing to its supporting and responding contact environment. It implies that the individual has called out in the mechanism of his organism the sort of resistant response he is seeking in the physical thing with the sense of effort which accompanies his own response. He asks of the thing to reply in the terms of his own conduct. This placing of one's self within the object and thus giving it an inside belongs to the formation of the hypothesis and, therefore, to the extension of the space and time of the manipulatory area as genuinely as to the alternative plans of action which belong to the reflective attitude. The extension involves the occupation of the distant object (which belongs in unreflective experience to the future) by a physical object which exists now, that is, at the moment of the manipulatory experience. It can so exist only in so far as a content of contact enters into the color and shape and sound, and this takes place in so far as the object in the field of the individual is there; its relation to him as a distant object not only calls out a response or a tendency to response or action with reference to it but also carries in some sense the result of the contact that would result from the action with reference to it. Our psychological account

of this is likely to be in terms of imagery in the consciousness of the individual, projected in some fashion into the visual object. This statement overlooks the fact that the object is what it is in its relation to the perceiver and that the relation of the object to the contact reaction is set up even at a distance. The object is square, heavy, and unwieldy as seen because the individual is ready to respond in lifting it, as he is to look at it. The characters which call out these contact responses are operative at a distance and have already aroused the beginnings of these contact reactions, which not only are there in readiness for the actual contact but direct the looking and the approach. But these responses of contact belong in the perceptual perspective to the future. To bring them into the present field of the manipulatory area, something answering to the pressure which will be experienced when contact occurs is required. As one approaches the object, one is in doubt as to the point at which one can best attack it. Shall one undertake to seize from this side or from that? One is reflecting, in other words, one responds to the reaction of heaving it from this side, which is already initiated in the organism, by a feel of the weight of the object taken at that angle, and then relates one's self to another position of attack, feeling the weight at that angle of approach. This we state in terms of motor imagery taken from past experience, but motor imagery is notoriously dependent upon initiating a motor response. We set up in ourselves the co-operative reaction of the object which is involved in the undertaking. That past experience guides us in this there is no doubt, but it does it by calling out the appropriate motor response. We exert a pressure, or at least initiate the response of pressure, in lieu of the pressure of the object to test our plan of action, and this pressure has in it the element of effort, which gives us the inside of our own organisms and provides the object with an inside.

In the unreflective perceptual perspective the object lies in the future as regards its reality and can justify the approach adopted only in the future. In the reflective perspective we are

testing hypothetically the particular approach by its present reality, by a contact content that exists now or simultaneously with the manipulatory area. This hypothetical contact content is provided by the organism initiating a motor response in the role of the object against its own effort of pressure. There are the two possibilities: we can await the pressure which we will meet when the initiated act has brought us to the object or we can test the act in advance by responding for the object by initiating an effort to bring about a suggestion of what the result will be. The testing takes place in the competition of different alternative reactions, and the result of the testing shows itself in the greater readiness with which we adopt one approach rather than the other. We can bring the distant object's reality of contact experience into the extension of the manipulatory area's present only by replacing its future pressure by a suggested pressure which the organism initiates.

The mechanism by which the organism initiates the pressure of the object by its own effort arises out of the co-operative attitude of the organism toward its immediate contact field. It induces the pressures that it needs for its reactions by its efforts against the objects about it. It secures the needed supports, the leverages, and momentums by actions which call out these actions of the surrounding objects.

This co-operative attitude is implicitly a social attitude. By a social attitude I mean one in which one organism, in a group of organisms, by its conduct stimulates another to carry out its part in a composite co-operative act. Illustrations may be found in the care of the young, in sexual acts, or even in fighting. Such attitudes are not in their earliest appearance reflective attitudes, but communication and significant symbols, and hence what we term "minds," arise out of them. The essential feature in this development is the stimulation in one organism that is exciting another to the same response that it arouses in the other. The vocal gesture is pre-eminently adapted to this function because it affects the auditory apparatus of the form that produces it as it does the others. The final outcome in human social conduct is

that the individual, in exciting through the vocal gesture the response of another, initiates the same response in himself and, in that attitude of the other, comes to address himself, that is, he appears as an object to himself in his own conduct. It is this attitude which is commonly denoted as "consciousness" when this term carries with it the implication of awareness over and above the mere presence of the perceptual object in the perspective or experience of the organism. The individual can then indicate to others what he is at the same time indicating to himself, that is, the gesture of indication becomes a significant symbol. It is commonly recognized that primitive men and little children spread this attitude over their whole worlds. The physical object is an abstraction from a social object, but it continues to retain in the resistance which we demand of it our own initiated responses of effort.

The reflective attitude is an attempt to set up a world of enduring things, that is, a world that is irrelevant to passage, as a basis for our alternative actions. It is a world that is cogredient with ourselves, and we are cogredient with it, that is, it is a world at rest within which motion takes place. Over against these motions we narrow the passage of the specious present to as small an interval as necessary for the purposes of measurement, so that the world approaches the world at an instant, the scientific ideal of the distribution of physical particles at an instant. In this world objects of immediate contact *are*. They are both seen and felt. The promise and fulfilment are both given. Beyond the manipulatory area lie the promises of contacts which constitute other physical things. In the world of space-time these objects lie in the future. The reflective attitude undertakes to bring them into the present of the manipulatory area. It undertakes to present a content of resistance which is cogredient with that of the manipulatory area. We see the bodies as hard, cold, smooth, or rough. Such contents must be "conveyed" if the bodies are to be there at the instant. The world that is there is a world of resistant things. This conveyance of contact characters belongs to the world of

the reflective attitude. In the perceptual space-time world, in so far as we are able to recover it, the object *is* not hard and cold and rough. We hope, fear, or anticipate that it will be, or at least are ready to respond to hardness, roughness, and coldness. What is present is this readiness to respond to hardness, roughness, and coldness, and those features of the distance characters of the object which are responsible for this readiness are said to convey these contact characters. The degree to which contact imagery enters into this conveyance is open to debate. Presumably when an artist paints "wet" water and solid, massive mountains, such imagery enters into the vision of it, but the recovery of such imagery as distinguished from the readiness to respond to such characters is very variable and uncertain. The readiness to respond in these fashions is dependable, and it is usually this which is conveyed by the distance qualities and indicated by a significant symbol. If now in reflection the perceptual object is to have a content of its own which can be dated from the manipulatory area, that is, can be simultaneous with that area, that content, as already stated, can only be hypothetical, in the first place, and, in the second place, such a hypothetical structure must include the physical organism, or physical self, as well. Objects in the world of reflection are defined by the relational structure of the field, and this structure includes and defines all objects within it, and therefore the physical organism as well. In the world of immediate action, the world of space-time, the definition of the object is in terms of the readiness to respond in a contact fashion when we have reached it, but the content of the object, the what it is, lies in the future. Our attitude does not require us to present the object as existing now. It calls only for present action that is organized with reference to a readiness to respond in a contact experience of a later date. In the manipulatory area the object has the content of its resistance, its feel, its temperature, and it is in this field that all experiment and observation (directly or by inference) takes place. The undertaking of reflection is to present an enduring fabric as a basis for alternative courses of

action, a world of things that have identical dates, namely, the date of the manipulatory area.

There are two characters of the hypothetical world and its objects at an instant, or rather the world that is simultaneous with the organism, which distinguish it from the perceptual world and its objects in space-time, in the unreflective world. These are the character of the objects as conditions of alternative reactions and their universality, since as hypothetical contact existences we assume their identity as the perceptual reality of all the different perspectives from which they are or might be regarded. This universality is not primarily recognized as logical but as supporting the hypothetical assumption of this reality. To say that the objects are hypothetical in their contact reality is to assert that we assume the attitude of seeking for confirmation of our assumptions. While these characters are distinguishable, they are generally fused in our experience, for they can be conditions of conduct only in so far as they are dependable hypotheses, and we are interested in their trustworthy nature only in so far as they may be conditions of possible conduct. In reflective perceptual experience this universality does not attach so much to the object as to the generalized attitude of the percipient. It is in the passage from reflective perception (what to the Greek was opinion) to ratiocination that the matter of the percept becomes the universal substance within which the other characters inhere. The generalized attitude of the percipient has arisen out of co-operative activities of individuals in which the individual by the gesture through which he excites the other has aroused in himself the attitude of the other, and addresses himself in the role of the other. Thus he comes to address himself in the generalized attitude of the group of persons occupied with a common undertaking. The generalization lies in such an organization of all the different co-operative acts as they appear in the attitudes of the individual that he finds himself directing his acts by the corresponding acts of the others involved—by what may be called the rules of the game.

By the character of objects as conditions of alternative reactions is meant that two or more acts with reference to distant objects in space-time are initiated in the organism, acts which exclude one another, and that the individual in whose organism this conflict takes place carries over the social attitude into the physical situation, though it is to be remembered that the original attitude toward so-called physical things was a social attitude. In this social attitude the individual arouses in himself the reaction of the physical thing toward himself. He initiates a response of effort in the role of the physical thing, and, in so far as there are common characters that are irrelevant to passage that will serve as conditions for alternative reactions, these attitudes will be assumed as the content of these physical objects. The result of this is that the individual addresses himself in the role of the distant objects and ascribes to himself the same hypothetical content that he ascribes to the objects in his perspective, in so far as he is a perceptual object in the perspective—and it is only as such that he enters into the reflection. The mechanism of the process is that of social intercourse in which vocal gestures become symbols of these contents.

It seems to be due to the social mechanism that the organism lies within the perspective that it determines. For it is within the perspective that the organism becomes an object, through the identification of the individual with other objects, and reacts to the self in the role of the other object. And it is the generalized other, i.e., the object as expression of the whole complex of things that make up the environment, that is the seat of the self as a representative of the inner nature of the thing, in its conversation with the organism. The individual calls for the response of resistance by his ongoing act, and this arouses the tendency to resistance in himself, and, in so far as these mutual processes are initiated within his conduct, both his contact and that of the object in terms of his efforts are there. But this takes place in a situation in which the organic self appears upon the same level of reality with the physical objects. It is not in this field that we can discover the steps by which the

organism takes the role of the physical thing, giving it the inside which belongs to objects in the reflective perceptual world.

It is in the field of space-time that we must seek the situation out of which the reflective experience arises. In that field the physical object is separated from the organism both spatially and temporally, and its reality lies in the future. The terminal attitude of the organism which in its initiation controls the act carries with it no content of present reality, and the adjustments of conflicting terminal attitudes may take place within this field by what is called the trial-and-error method. Such adjustments we see taking place in the conduct of lower animals, and we can identify them in our responses in types of skill where we find out what we are going to do by doing it. In these situations the content that answers to the adjusted act does not exist for us in the adjustment. Thus the artist finds in a tentative production of his object what it is specifically that he is trying to produce, or one picks one's way over a difficult terrain, finding the security one seeks by answering to stimuli that one could not identify as specific things.

If one succeeds in identifying the stimulus, but is in the conflict of reactions checked in the response, deliberation consists in the prefiguration of the co-operative response of the object to the organism's reaction. This involves not the vague and uncontrolled presence of imagery of past contacts but a sort of experimental testing of the resistance which the object will afford against the effort that the organism will expend. The only controllable content of this sort is found in the initiating of efforts against each other, such as that of one hand against the other. This content can enter into the object only as the individual, in the co-operative reactions of the organism and environmental objects by which balance is maintained or adequate leverage is secured, both seeks the resistance required and also arouses in himself in response to this appeal the beginning of an effort such as would provide the resistance sought. It is, however, present in experience only in so far as competing situa-

tions appear. Undoubtedly the fragility or stoutness of an object is present as an expression of past contacts, but these past experiences can get into this deliberative process only in so far as the organism gets inside of the object and offers the resistance anticipated. The sort of resistance which the object will offer appears in the experience of the organism in the sort of response that is initiated in reply to the stimulus rather than in the imagery of the past experience. It is in reply to this initiated response that the effort of the organism in the role of the physical thing appears. One pushes from the inside of the thing against the effort one is preparing to exert against it.

While one may speak of the organism as preparing to exert this effort of itself against the object and from the inside of the object against this effort, it is necessary to keep in mind that the organism as a material thing appears as a visual object and, as such, is always a distant object. The picture one has of the central nervous system as the mechanism through which these efforts are initiated belongs to the reflective perceptual world. This organism stands upon the same level of reality as that of other perceptual objects, except that the confirmation of the hypothesis of the contact reality is at once at hand, so far as the surfaces of the body are concerned. What is going on inside the body as an imagined visual process can only be reached by indirect confirmation. In other words, the world of perceptual experience with which science deals is a world of visual things at a distance, which reaches the manipulatory area only in those observations and experiments in which the findings can be indicated in the perspective of the individual in the form of that which is accessible only to himself. While the occurrence is one that presumably may be accessible to others who can find themselves in a like situation, the experimental data are stated in the character of that which might not be brought into any other perspective and still could be reported. Logically this is a particular event as distinguished from an instance. While the event lies in a reflective world, the experimental datum has a phase or element which has as yet no meaning beyond its happening in

the perspective of the individual. It is essential to its experimental import that it should be identified as such a piece of the biography of the individual and not be established by inference. It is indeed reflectively identified by the individual, but as such a happening to him, and he records the situation in all the meanings which will enable him and others to repeat the experience and determine whether the same happens again. The actual happening, however, and the what that happens is not taken in terms of a physical thing that belongs to a simultaneous nature. The experimental datum is an isolated bit of unreflective experience that is caught in its immediacy, without the reflective reality of a physical thing. It is a bit of the Minkowski world, but isolated.

The possibility of its isolation lies in its identification as a bit of the perspective of the individual. From the standpoint of the world its reality lies in future experience. What can be brought into the specious present with its simultaneity is the experience in its relationship to the organism. The datum can be stated in terms of *sensa*. The statement in terms of the organism is in terms of the conditions of the organism as a reflective perceptual object under which this experience has taken place, so universally stated that the experience may be repeated either by the individual or by another individual. It is in the complexities of this situation that all the problems of epistemology are centered. There are here three different types of reality that become confused in epistemological theory, though there is no confusion of them in the conduct they mediate: (1) the reality of the object in the manipulatory area, (2) the hypothetical reality of the distant object in the reflective perceptual world, and (3) the future reality of the distant object in the space-time world. The scientist's untroubled procedure with all three is sufficient evidence that in conduct they induce no conflict. In observation and experimentation the scientist stands upon the unquestioned reality of the handled apparatus and concomitants of his experimentation and observation. The reality is extended beyond the field of the manipulatory area if no question as to

the reality of distant objects arises, though an attitude of readiness to recognize its hypothetical nature is a characteristic of the scientist. Furthermore, the universality of his hypothetical object carries with it an implication that he can state even the objects of the manipulatory area in terms of the hypothetical object, in so far as his theory calls for this statement. However, the reality of them is that of immediate experience, which as his is not dependent upon the hypothetical content he puts into the object. In so far as he has centered his observation upon an experimental datum, its reality lies in the future. It is not given except as something that is happening to him. It is a bit of the space-time world that can be held on to as a piece of the biography of the individual; but what is given is an experience in the perspective of the individual, the content of which is to be found out. As soon as he is fashioning a hypothesis of this content, he is dealing with the hypothetical reality of the reflective perceptual world, and he regards the what the experience is, its content, as existing simultaneously with himself.

The epistemological muddle is due to reading all the characters of the experience in terms of this biographical stuff. The object of knowledge is the unknown content, which lies in the future. As soon as the reflective problem arises, the future reality of the object is given a possible hypothetical present reality as a basis for alternative reactions, and the immediate distance experience becomes the evidence of this hypothetical reality and is dated in its relation to steps which will be taken in the determination of the different hypotheses; and the distance experience, instead of being simply the stimulus to the reaction by which the act is carried through to ultimate contact, becomes the hypothetical experience of the thing as it appears to the eye when we are in contact with it. We see it as in the manipulatory area. Thus we see distant individuals as of the dimensions of those at close range. But much of our distance experience does not lend itself to such immediate experience, so that we place it as the immediate experience of the individual in his perspective with the hypothetical interpreta-

tion of the reality of a physical thing. It is, then, the experience which we have of a present existing hypothetical thing. It is both dated in a present and related to the perspective of the individual as a distance experience. So stated it is a part of the biography of the individual, and the hypothesis can also be so regarded; and even the immediate object within the manipulatory area may be analyzed into such elements, together with the future reality of the object.

Such an analysis, however, overlooks the fact that the individual could not identify his own perspective except in so far as he gets out of it. He could not place experiences in his biography except as he distinguishes himself from others. It is evident that this reflective process is one which is possible only in so far as the individual becomes an object in the experience of the individual. The "what the object is," its inside, is primarily its meaning, that is what it would do to the individual. As a physical thing this meaning is its reaction in a possible contact to the manipulation of the individual. In order that this possible reaction may be present in the perception, the distance character of the object must lose its future value (i.e., the calling-out of a reaction which leads up to the contact, which is not given but lies ahead) and must get a content which is on a par with the contact value in the manipulatory area. The distant object must become simultaneous with the individual and his manipulatory area. Simultaneity is identity in the "now" of the individual. The "now" of the individual can be identified only over against the passage in the specious present. To identify such a "now," the individual must stand off from himself and locate the "now" which is identified with himself. He must be in the attitude of indicating it to himself. The indication is in terms of the consentient events and what occupies them. It is in so far as the individual identifies such a group and relates them to himself that he can identify the "now." The "now" of the individual is identified by the manipulatory situation in which the promise of the distant object is given in the contact. If this is to be extended to the surrounding field, it must be

through the placing of a contact content within the distant character of the thing. The act which is completed in the manipulatory process of handling what one sees, must be hypothetically completed in the consentient set. This is a process which takes off from the social behavior in which the social self appears, thanks to the attitudes of others which we excite in ourselves through our stimulation of them. The self is an object on the same level of reality as that of the others. The sight and voices of others are there, but the selves, the insides of the social objects, are hypothetically given through the conduct of the individual in the role of the other, in the fashion indicated above. This is a field of behavior in which physical things in the manipulatory area simply are there. There is with reference to these no cognitive attitude, though this thereness of the physical thing does not go beyond the fulfilment of the promise of the distance experience, the contact of what is seen, for example. The further nature of the physical object, as known in scientific fashion, always involves the introduction of a distance between the organism and the structure of the object which is only hypothetically covered. Surrounding this area, which with the mobility of the organism is variously extended, lies a world of distance experiences, which are stimulations to approaches or departures with terminal attitudes of contact, but primarily without an inner content, though their spatiotemporal distances are there with the bounding surfaces. The parts of the organism are there with their peculiar characters and, finally, presumably the organism as a whole bounded by the surrounding physical objects. For this is both felt and seen. The parts of the organism and the organism as a whole have insides as well as outsides. As yet the other physical things have only outsides. The earliest behavior of the human infant is social, that is, it is called out by behavior of other organisms in answer to inner impulses, and the characters, and especially the movements of these other organisms, are determining stimuli to the infant. Among these stimuli are the sounds which the infant hears and to which he replies. He attracts by his cries the atten-

tion of those about him, and they reply not only by care but with answering sounds. The infant calls out in himself sounds of the parent-forms by his own vocal gestures, and reaches the point of thus conversing with himself, though at first this conversation is but the play of sounds calling out answering sounds in the babbling of the infant. There is as yet no social object and no self. The two appear together, and they emerge from a behavior that antedates them. The self speaks to itself with the voice of another, but it cannot do so until it speaks with its own voice. The essence of the other must have become the self in order that the self may exist. And the other cannot exist as an object except as the essence of that other is the self.

This appears in the form of perspectives in nature. The nature of the environment of the biological form is its relationship to the form, what we term the logical determination of the environment by the form. On the other hand, the form is that which the environment does to the form, what may be termed the causal determination of the form by the environment. The spatial mapping-out of the world from the standpoint of the physical thing is the setting and bounding of it, while the volume of the thing is the effect of this setting and bounding in the thing itself. A similar statement may be made of the interrelation of any mass or embodied energy and the system of masses or embodied energies that is essential to the existence of energy. What is involved in all these situations is that the content of the object is the statement of the thing in terms of other things, the content by which it can affect other things, while the content of other things by which they can affect it is in terms of its susceptibilities to them.

The logical determination of the field by the individual, of the environment by the biological form, of the consentient set by the percipient event, results in the appearance of objects, which would not otherwise exist. They exist in the perspectives. The most concrete form of these objects is that of social individuals in human society. An abstraction of these is the environment of the biological form in which appear objects deter-

mined by the physiological nature of the living form. A further abstraction is the consentient set in which appear objects at rest and in motion, determined by the relation of here and there of the percipient event.

Now it is evident that the appearance of objects in the world of human society is responsible for the actions of human individuals. They are objects because of the susceptibilities of the human individuals. Wealth, beauty, prestige, and various other objects appear in this environment because of its determination by the human social individual, and these are the springs of conduct. The same may, of course, be said of the environment of the biological form. Food, danger, sex, and parenthood are all springs of action and are such because these objects are determined as such by the susceptibilities of the animal forms. Finally, physical objects are at rest or are in motion because of their determination of the here and the there of the percipient event, because they fall within the consentient set of a certain individual. If a body is in motion, it has certain physical characteristics which it would otherwise not possess. The doctrine of relativity has shown that these characteristics include not only momentum but also the configuration of the form and the duration of its changes. This latter situation introduces a fundamental transformation into the theory of determination. As long as one assumed that the physical changes (those of the objects of the physical sciences) were independent of the logical determination of the environment by the individual, it was possible to present a series of changes of ultimate physical objects determined by their laws which would be identical in whatever consentient set (or biological environment, or social world); and the nature of these objects which arise within these different perspectives would be relegated to the experience of the forms themselves, while the physical configurations, and the spatio-temporal changes, and the quantities of energies involved would remain identical, whatever the point of view from which they were regarded. Thus the conduct, for example, of a human individual in pursuit of wealth or political preferment, expressed in

terms of every action of the man, would be analyzed into movements of the ultimate physical particles constituting the man and his environment. He would seem to himself to be pursuing wealth and preferment; actually every act would be the necessary result of the previous positions of the congery of physical particles that make up the universe. From this standpoint food and hunger, life and death, disappear as entities in nature and become physical and chemical processes which in themselves and in their ongoing carry none of these characters.

If, however, we assume that every system determined from the standpoint of the individual thing is an aspect of the universe that is objective; that this objectivity involves even the configurations and spatiotemporal changes and quantities of mass and other forms of energy as belonging to this system; that the universe is an organization of such aspects, then all objects and all processes suffer the logical determination that belongs to the perspective of the object, and this determination belongs to nature as revealed in the abstract physical sciences

Above these perspectives stands the human social perspective with a character which these do not possess. Those below this human perspective are shut within themselves, just because they are perspectives. Each is a prehension of the universe within which the whole universe is mirrored. It is an aspect of the whole, and, because it is an aspect of the whole, there is no footing in it, no point of view, from which another aspect can appear. If such a point of view of another perspective did appear, it would not be in this prehension. But it is just the character of human reflective experience that it is social, i.e., that the individual regards his own perspective from the standpoint of others. If he so regards his own perspective, he must regard himself as well, for while within a perspective, the field is simply there for the individual and excludes the individual himself. He could not be both determining and determined. But, if he can regard the perspective of another, he must enter into the other to reach his perspective, and yet, as it is another for him, he must be regarding the other as well. This must be equally

true of his experience of his own perspective and of himself in the role of another, or of others. We call this self-consciousness.

The technique of this and how it can have arisen in evolutionary process I have already indicated. As such it belongs to the development of a social biological organism which is parallel to those of the bees, ants, and termites, that is, of a situation in which there is such an organization of the different perspectives of the members of the community that an organic structure of the members of the community makes possible a field or perspective of that community. The same would be true of any complex structure of which (to use Whitehead's phrase) the universe is patient, but in the case of the social structure of animal forms the individual perspectives of the separate forms in terms of their sensibilities stand out so sharply that the likeness to the human situation is not only emphasized, but the peculiar characteristic of human intelligence is presented with equal definiteness.

The precondition for such a development on the human level is that there should be such a community perspective, that there should be objects which exist in their relationship to the group, that is, that there should be common characters which exist for all the members of the group, though they exist also within the perspective of each individual. A further precondition is that different responses of the different individuals in corporate activities should be such that they can be called out in all the different individuals, i.e., specialization cannot go so far that the tendencies to perform the varied acts in the community activities cannot be in some degree initiated in any form. In such a situation if one individual stimulates another individual to his part in the common act, and if that stimulation can affect himself as it affects the other form, it may place him in the attitude of the other through initiating in him the response of the other, and thus place him in his perspective in so far as there are common objects. Thus a cry which arouses another to assist an individual in danger may act as a stimulus to the same act to the one who cries out. The further requisite is that this commenc-

ing to act as the other does should itself become of value in carrying out the common act, so that planning a common undertaking arises. Through this type of social conduct the individual becomes all the members of the group, and thus in some sense the group itself over against the group perspective, but he does it by both entering into the attitude of the other and finding himself in this attitude with its perspective within his own perspective. It is a deliberative attitude in which the individual indicates situations to himself by indicating them to others in so far as he assumes the attitudes of the others as the result of his own gesture. It is a process by which he puts an inside into the other who is otherwise only a distant social object.

XIV

THE PERCEPTUAL MODEL IN SCIENCE

THERE appears to be an important methodological distinction between the perceptual world and the so-called microscopical and submicroscopical world in scientific procedure, though the two shade into each other, as is evidenced in a "model" type of hypothesis and a mathematical type in which the attempt to present the hypothesis in the form of a model is more or less frankly abandoned.

In the perceptual world the physical object is real if it could be conceivably sensed in contact experience, though the contact experience is scientifically stated in mass, with figured dimensions given in vision, which could be conceivably substantiated by contact. In the submicroscopical world such models may be abandoned, and the object be stated in terms of mathematical formulas which present them in relations.

The content of the physical object is stated in terms of energy—mass or electromagnetic. Energy is conceived of as that which is responsible for motion and change in the amount and direction of motion. For its definition it is essential that the physical object should be in a system in which the law of action and reaction holds. Given such a system, it is possible to define a physical object that is a member of the system in terms of the changes within the system for which it is responsible.

In the case of the model, or physical thing in the sense indicated above, the contact is the substance that remains unchanged while other characters vary. It is content in the peculiar sense of the rigid body which is used in measurement. That is, it is that which does not change in motion in translation or rotation, and so determines the nature of the space within which the motion takes place. The visual and auditory characters of

the moving object change with motion. It is the effective occupation of tactual space that is the ultimate nature of the physical thing. Newton's definition of mass as the quantity of matter reflects this, as does the use of the rigid body in measurement of Euclidean space and the determination of that space.

The fundamental difference between the two worlds indicated above appears when the changes in mass incident to motion are stated. In terms of quantity of matter the increase in mass with velocity is meaningless or miraculous. The increase in the energy of inertia presents no obvious difficulty.

The difference between the two worlds lies in the difference between the nature of the thing in the two. In the perceptual world the thing is that which fills contact space; in the other world it is energy (that which is responsible for motion within a system of moving bodies). We have abstracted from the perceptual thing and measure this nature in terms of changes. While in the perceptual world we can present this thing in the form of the occupation of space and measure its amount in terms of this quantity, in terms of energy we are dealing with that which has no immediate presentation value but must be realized in its effects. The proportionality of inertial mass and gravitational energy removed the danger of any conflict between the two conceptions of the nature of the physical thing in Newtonian mechanics.

Renaissance physics, in stating the conditions for the sensuous characters of objects in terms of masses in motion, still left the possibility of presenting perceptual models of what takes place in color, sound, odor, and taste. Minute extended things which would have been perceptual to fingers minute enough to feel them involved no contradiction with the thought of them, so that, though the same mechanism was appealed to in explanation of tactual sensations as that which explained the so-called secondary qualities, the imagination was still free to subdivide matter indefinitely and still keep its perceptual models. When we remember that the rigid body that remains what it is when moved in translation or rotation is the presupposition of Euclid-

can space, the added importance of these perceptual models can be realized. What is involved here is a spatial figure that has a material filling. If this material filling can be identified with mass, a perceptual model remains possible in scientific hypotheses. If the figure and the energy or what an object is vary with its velocity, a perceptual model becomes inadequate.

It is the electromagnetic investigations which have pushed the submicroscopical field into prominence. Here the nature of the scientific object becomes electricity in some phase. It cannot be stated in terms of quantity of matter. While it is subject to spatiotemporal characters, that which undergoes this spatiotemporal definition can in its nature be stated only in terms of energy, i.e., in terms of the motions of a system of objects. It must, therefore, be possible to trace the motions and determine them with exactitude before the content that goes to make up the nature of the scientific object is reached. The question then arises whether we can consider the so-called energy as a characteristic of the system of objects whose changes we measure to determine the energy which is the nature of electrical charge or of the electron or proton. Seemingly, however, the results of scientific analysis compel us to presuppose physical elements which could not have the characters of the objects in the system whose motions we measure in order to determine the energy which is made the nature of the scientific object, e.g., the nucleus of a helium atom whose path we trace in water vapor cannot be stated in terms of the spatial, temporal, and energy units which are used within the field within which its changes take place. This is otherwise stated in the transformations of the Maxwell equations which are necessary to render them invariant when they are referred to sets of electromagnetic objects that are moving with reference to the field of observation.

The peculiarity of the submicroscopical field lies not in the minuteness of its elements but in their electromagnetic nature. The results of the work of Maxwell identified light with electromagnetism, while it stated the content of the electromagnetic object in terms of its field of force. The Newtonian conception

of mass as the quantity of matter stated the nature of the object in terms of its spatial dimensions. The physical object was there in advance of its relations to other objects. The system of objects can then be conceived of as built up out of the objects which are logically antecedent. These objects determine also a Euclidean space, as the objective nature of the object does not change with motion. It remains what it is no matter what its velocity or the character of the motion. A body whose nature lies in its field of force cannot be conceived of apart from the system within which the force can operate, i.e., a force implies a motion which it affects, and the measurement of it implies a system within which the quantity of motion can be determined. While one can state the nature of any perceptual body in terms of energy, given its membership in a dynamic system, it has a nature or reality which is independent of this formulation. This reality belongs to it as that which is given in a conceivable contact experience to which a distance character invites. An electromagnetic object, being stated only in terms of fields of force or of energy, has no such conceivably independent character. Force and energy can be stated experientially only in terms of effects. These effects are of something, and the something cannot itself be stated in terms of energy without an indefinite regress. We come back either to the objects of perceptual experience or to a metaphysical thing-in-itself. A scientific imagination may pursue its perceptual object beyond the realm of normal or microscopical vision and thus enter the submicroscopical world and still use perceptual models. The ultimate statement of objects in terms of fields of force or energy allows of no such pursuit. Confusion arises, however, because we locate the object within space and time or within space-time. We determine the position, the mass, the diameter, and the path of the electrical charge, and these all invite the use of perceptual models. The Bohr atom is an outstanding illustration of such a model, in which the content of the object is energy which is spatiotemporally defined. The mathematical physicist, however, escapes from the confinement of these perceptual spatiotemporal forms

by embodying them in mathematical formulas and, by this apparatus, can add any desired dimensions to his space or give it non-Euclidean characters. This situation is further complicated by the doctrine of relativity which teaches that the figured character of the perceptual object changes with the relative velocity of the object, i.e., it reduces the shape and inertia or resistance of the object to secondary characters.

The world to which science refers, then, is submicroscopical in the sense that it implies systems of objects which are presupposed in the definition of energy and have characters which lie beyond our experience. What is revealed in experience is motion that can be spatiotemporally determined.

The spatiotemporal determination of the scientific object under relativistic theory is almost as abstract as the nature of the object. In the first place, the space and time are recognized as conceptual in the sense that they are not the space and time of the perceptual world. There is no right and left or up and down, nor is the time the duration of our immediate experience. Space is conceived in terms of co-ordinates, by means of which position and distances are algebraically stated with reference to an origin and measured on intervals from the co-ordinates. Space thus becomes relative to the origin, or point of reference, and to the unit of measure. As position has to be determined with reference to some co-ordinate whose selection is arbitrary, absolute space disappears; and, as the character of extension depends upon the character of the measuring unit, which may vary its nature in different fields, the structure of space becomes dependent upon the nature of the field of objects. The discovery that a measuring rod from the standpoint of a field of rest, if it is itself in motion with reference to that field of rest, is shorter than it is from the standpoint of the field that is in motion provides another perspective which, since the distortion is dependent upon the velocity of the moving object and its system, may be called a temporal perspective.

The homogeneity of space is indicated in the congruity of the rigid body which is used as a measure in different situations and,

if we conceive of space-time and hence of the passage of space, by the congruity of the rigid body with itself. This still leaves the conception of "straight" undetermined. It is practically determined by the line of vision, i.e., by the line of the ray of light. We sight along the edge of a board and so determine its straightness. Physiologically, we keep the body in line with the distant object toward which we are moving. The distant object is a control by which we continually correct the tendency of the alternate steps of a bilateral system to push the body out of its direction of shortest approach. The shortest distance between two points has, then, a physiological import. It is the line which we keep when we approach a distant object under the control of the visual stimulation of that object. The process is one that also provides a physiological definition of the equality of the steps into which the continuum of the distance as given through vision is divided by walking. Our bilateral symmetry requires that a step from one side should be offset by one from the other, and so arises the functional equality of the series of steps with the continuum of the line of vision. Primarily the line of vision is not itself broken up into equal parts but is achieved by a set of functionally equal units or steps. It is the congruence of the line of vision with the line along which one steps that leads to the division of the continuum into parts. In the field of action the continuum is not divided. When secondarily it is so divided, each portion has the value of the original line of vision which is not itself divided but which is achieved or attained by a set of functionally equal steps. The equality of the continuum to the steps is not immanent in the distance of Achilles from the tortoise but has to be achieved. It follows upon the completed act. The fallacy of the ancient argument lies in identifying the tertiary equality of the distances of an indefinite set of intermediate goals with the original distance, with the achieved equality of the steps of Achilles to the continuum when he has overtaken the tortoise.

Space, then, appears as the development of the characters of

spatially qualified objects within the field of distance stimulation. The object is ultimately that contact experience, for this is the positive or negative goal of the act controlled by the distant stimulation. The act results in contact. Our perception, therefore, tends to correct the distortions of vision at a distance by the characters of contact objects. It is true that we define this object through vision, which is vastly more accurate than contact. The straight edge or line we reach through vision. However, it is a vision that can substantiate immediately its anticipations by the findings of the hand. Within the radius of the arm we have acts which are completed. The distant object as seen is at hand and is handled. It is legitimate to call this perception a collapsed act, and it remains the model of the physical percept; and we tend to supplement either the vision or the feel, where either is absent, but in this field of manipulation distance and contact experience fuse. We even give to the distant object at times the dimensions it would have if close at hand. The space of this field of manipulation is Euclidean. A rigid body is congruent with itself, and the axiom of parallels holds, i.e., the rigid body revolved retains its shape and previous dimensions. The space of Euclidean geometry is the extension of this space of the manipulatory area, in abstraction from all characters except those involved in the system of Cartesian co-ordinates.

The psychological mechanism of seeing the distant object in terms of the field of manipulation can in part be readily conceived. It consists in the assumption of the attitude toward the distant object that we have toward the same object near at hand. We are ready to act toward the distant object as if it were near by. There is, however, a profound difference between seeing the object "in its own dimensions, like itself," and merely acting so as to bring ourselves to the object to manipulate it. The difference may be illustrated in the following of directions by which one reaches a distant goal which one does not place in one's perceptual landscape. Each corner and landmark is a stimulus to turn and proceed in a fashion correspond-

ing to the directions. When one has reached the goal, one may relate the goal and the path by which one has reached it to one's accustomed landscape. When this is done, the goal has the physical values which all distant objects have for us, those corresponding to attitudes of response which immediate proximity calls out. When we see things in the dimensions and form of the manipulatory area, we are in a measure seeing the distant object in terms of a space which is the extension of the Euclidean space of the manipulatory area, and thus substituting this space for the Riemannian space of vision. Thus we see the elliptical top of the table as round and the corners of the ceilings as right angles. Seeing the ellipse as round and the angle greater than a right angle as a right angle is the control of the visualization by the attitudes of the response belonging to the manipulatory area. It is the control of a Riemannian space by a Euclidean space. We are ready to act toward the shorter diameter of the ellipse as if it were equal to the longer diameter. The extent to which the sensuous content of the percept may be affected by this control is shown in various psychological illusions.

The assumption of the attitudes of response to the physical object within the area of manipulation involves, however, another factor in perception, the response of the thing to our own acts toward it. This is most generally given in what is experienced as the resistance of the physical body, to be clearly distinguished from the pressure of the body as experienced on the surface of our own organisms. What calls for recognition is the reciprocal character of physical objects and the organism. It is the contact of physical objects with the organism and the organism with physical objects that gives to the organism its outside and to physical objects their insides. All physical objects have insides in our experience. These insides are never reached by getting inside of them. This process merely exhibits other outsides. The insides arise through the interaction of bodies and the organism. The bodies act upon us, and we act upon the bodies, and this takes place only through interaction. There is

only one source for this acting of the body from its inside and that is the excitement in the organism of the attitude of resistance of the body through the action of the organism upon it. It is through taking the attitude of things about the organism that the organism defines itself over against things. It is this which Whitehead refers to as the "the pushiness of things."

If we trace out these attitudes which are in experience the insides of physical things, we find ourselves presenting them in terms of the operation of elements of the nervous system. The nervous system and its elements, however, belong to the realm of physical things. They may be observed to a certain extent in living organisms, or on the dissecting table, but predominately in imagination of what may be going on within our organisms. It is in this fashion that certain psychologies paradoxically introduce the physical environment into the brain and set up a solipsistic world within the skull. On the contrary, the nervous system in such observations is always outside the observer. Furthermore, the situation within which the organism and its environment are present is a mutual one. If the organism endows the physical things with their insides, the physical things endow the organism with its outside, and thus give it its location and boundaries within the world. An inside has significance only with reference to an outside.

We find in experience as the presupposition of our analysis a world and the organism, or, rather, organisms. This world is real in terms of perception when the act involving the distant field is accomplished and the anticipatory attitudes which this distance field excited have been realized in contact. That is, in the world that is there, in advance of problematic situations and reflection, uncertainty and hypothesis are present in the distance field. Uncertainty shows itself in alternative possible responses answering to different possible objects, and hypothesis is represented in the tentative character of the object—the organism is ready to discover differences in the object as approach and contact ensue. Immediate experience also carries with it

the dependence of the character of the distant object upon the relative position and sensitivity of the organism. The active processes of sensing—spying, sniffing, listening—as well as the selective character of perception, carry with them the involvement of the organism in the form which the percept assumes. Relativity and the triadic relation of the distant object, its nature, and the organism are but reflective developments of characters of immediate experience. In immediate experience the object is what it is in the manipulatory area, when hand and eye agree. Up to this point there is uncertainty, and tentative organization of the object.

XV

THE EXPERIENTIAL BASIS OF NATURAL SCIENCE

A. BASIC ASSUMPTIONS

THE presentation that follows advances upon two suppositions. In the interest of clarity it will be well to state the two presuppositions at the outset.

1. The reflective experience, the world, and the things within it exist in the form of situations. These situations are fundamentally characterized by the relation of an organic individual to his environment or world. The world, things, and the individual are what they are because of this relation. If presented as different from the form in which they exist in this situation, the difference is due to their existence in another situation similarly determined. These things and situations are identical in so far as their characters are the same and differ in so far as these characters differ. There are real identities, but these identities do not constitute things which have separable existences from the objects within which the differences exist, though in the isolation of abstractive thought they have been so presented. The peculiarities of the different situations are not those of appearances or phenomena which inadequately reflect an absolute reality. These situations are the reality. The identical characters of objects in the different situations are the basis for intelligent conduct, which involves different situations.

In regard to things, the identity we depend upon is the actual or inferred identity of contact experience, mathematically given in congruence in space and simultaneity in time. We note the identity of distant characters in different situations, but in so-called scientific explanation we state these in terms of the natures and changes of bodies that are identical in actual or inferred contact experience. In general, there are those rela-

tionships, which are subsumed under meaning and concept, that may be identical in different situations.

2. The comparison of different situations and the recognition of identities and differences within them imply the constitution of the different situations in the experience of the same individual. However abstractly and symbolically this may be carried out, the abstraction and the symbolization can only take place over against an experience within which to some extent the compared situations actually exist. The statement of such an experience necessarily involves psychological analysis.

B. PSYCHOLOGICAL ANALYSIS AND TEMPORAL EXTENSION INTO PAST AND FUTURE

Psychological analysis is the statement of the process by which the individual in a situation extends its temporal extension into a past and a future by the assumption of certain of the attitudes which the distance experience implicates. In so far as a thing has the value of futurity, it is found in its relation to an individual whose ongoing conduct is determined by the result of the act which the distance relation has initiated. The psychological analysis has primarily to do with the determination of the situation through the individual. In this determination we speak of the object in terms of sensuous qualities, spatial and temporal perspectives, and imagery. If these characters inhere in the object, their reality is incident to the completion of the act, the actual or inferred attainment of the contact values which the act implicates. That is, their reality belongs to the future. The establishment of the future, with its relationship of temporal extension, identifies that with reference to which it is future, in other words, the present. The present as content embraces the contacts and other values of the act as an ongoing affair. It also embraces those distance characters whose reality lies in the future, but which immediately determine the conduct of the individual. These two implications of the distance contents relate them, on the one hand, to the reality of the thing, i.e., state them in terms of actual or inferred contact values to

which they refer, or which explain them, and, on the other hand, state them in terms of the determination of the organic individual by the environment, i.e., in terms of so-called sensations, or rather of the organic processes which show this determination. These characters are, therefore, subject to a twofold abstraction—from the future reality of the things and from the past organic processes in the individual. They are, therefore, the present with reference to which these temporal relations are determined.

These characters have, therefore, a reality which is to be determined by later conduct. In so far as we act without question upon the stimulus of the distance stimulus, this reality accrues to them, and no abstraction is made of the present experience. They constitute the perceptual object. They are there; they are not known. When their reality is called into question, the abstraction is made, and they become what are called sense data. This same character of sense data belongs also to contact experience when we pursue the inquiry into the structure of matter by the use of the microscope or the imagination. In these cases the contact experience of the object appears actually or in imagination in terms of vision, that is, as distance experience. Its reality, then, belongs to an inferred conceivable contact experience. In this fashion contact experience itself falls into the realm of sense data, but only when the inquiry substitutes its distance characters for its contact character. If we turn the process around and, starting with the reality of the distance experience actually or in imagination, produce the conditions which bring about a distance experience, we have removed the original distance experience, e.g., vision, from its position and have substituted for it the minute objects of scientific hypothesis. In doing this, not only have we abstracted color from the object but we have given it a temporal position which does not belong to it. We paint the object, as a contact object, with the color. We give it its color at a moment when color does not belong to it, and we account for the fact that it has color in its statement as a contact experience by making the

color a state of consciousness. We also overlook the fact that we are still pursuing objects which are distant objects, and are revealed under the microscope or in imagination as colored objects. And we do the same with the imagery of memory and imagination, because the distance experience is removed from possible contact, we constitute them states of consciousness. In memory the implied reality is forever lost to possible experience, and this is true of a great deal of the free use of the imagination. Imagery, therefore, seems to present a content that cannot be real, that cannot belong to the real world, and therefore is placed in the field of so-called consciousness. It is easy, then, to assimilate to this distance experience, and even contact experience when this has been substituted, through scientific hypothesis, for the distance characters of things.

It is the temporal aspect of things which is responsible for their psychological character. It is in so far as the reality of the thing is affected either with the future or with the past that we are able to isolate elements which are referred to the experience of the individual, which are abstracted as psychological contents. Things are what they are in the relationship between the individual and his environment, and this relationship is that of conduct. The stimuli from distant objects invite reaction leading up to contact experiences. The stimulus belongs to the inception of the act, while the contact belongs to the completion. As an object in so-called perception, it is simply there, with no temporal characters. The question whether it will be what it is, or whether it was what it is, splits the object into the content that is immediately functional and that which awaits the completion of the act or that which was the completion of a former act. The content that is immediately functional belongs to that part of the situation in which the act is proceeding, i.e., to the individual, while that which awaits the completion of the act lies in the environment.

In the reflective process in which this question is asked and the answer sought, action is taking place, and objects are the

means of the investigation. The division of the object, therefore, sets the element which belongs to the individual over against objects within which no such division has taken place. Objects seem to remain in their full content, even after the abstraction has taken place. The experimental process which enables us to answer the question goes on in a world which is not immediately affected by it. Thus the psychological element receives a status outside the world of conduct. It is only at the moment at which the question arises, e.g., whether what one sees is one thing or another, and while one stands in immediate doubt, that the simple division of the object into its two parts takes place. The vision becomes psychological as soon as the individual undertakes by various means to determine whether what appeared as vision is what it purports to be. The things which have both distance and contact values, i.e., are percepts, by which the answer is sought isolate the vision as having a character which is not that of the surrounding objects but which is related to them through their conditioning its appearance, not through its calling-out a response which an ultimate contact experience justifies psychologically. We use the real world to explain the distance experience, not as the conclusion of the act which the distance experience has initiated. In the meantime the distance experience has an existence entirely in the individual. It is the combination of these two phases of the experience which make up its so-called mental character. It is outside the real world and it is inside the individual. It is, furthermore, in a present which has been, by the problematic situation, abstracted from the future and the past. The full reality of the object which is subject to the analysis lies in the future or the past. The future and the past that cling to it are relegated also to this present and appear as present imagery. They also are mental, and the philosopher may take the final step, which the scientific psychologist, i.e., the experimental psychologist, refuses to take, that of relegating all experience to this knife-edge present.

C. THE SPECIOUS PRESENT

When the philosopher takes this Berkeleian position, he ignores the fact that such a knife-edge present is a fiction set up for the purposes of the most exact measurement possible. However, the future and the past come back even into the psychological present, in the so-called specious present. The psychological or specious present is specious because, while it is an actual duration and not a knife-edge present, its duration is not that of the completion of the act within which the object is there, but that of reflection, i.e., the act of indicating, by gesture or significant symbol, the present characters of things at a distance in the individual. They are related to the individual, not to the object, and this indication takes place within a world that is there, a world of objects of which we are not reflectively aware. Corresponding to these abstracted elements of the objects are the objects which we refer to as the conditions of the distance experience, and which are therefore deprived of their distance characters. In the immediate process of indication, however, we reach abstractions that are freed from the distance characters and yet, lying in the world of direct perception or imagination, are assigned position over against the investigator, i.e., they are physical things in the same sense as that in which the analyzed objects were physical things. The abstraction from the distance characters, and the other imagery which clings to these, is ambiguous. On the one hand, it is logical, i.e., it is an indication of a character, excluding attention from all but this character. This leaves the relation between the character and the rest of the object open to determination. The Aristotelian conception of this relation is that of substance and attribute, that of inherence. Another metaphysical bias may substitute for this relation that of uniform association, or that of spatio-temporal conjunction. What is of moment in regarding this type of abstraction is that a synthetic process restores the abstracted characters and leaves the object with the same content as that which preceded the analysis. On the other hand, it is causal, i.e., it determines the causes or conditions under which

the distance experiences arise. It is not an abstraction in a logical sense; it is an explanation, or, more fundamentally, it is the organization of the steps or means by which one reaches certain experiences. If we call it an abstraction, it is one which abstracts what we treat as a cause from what we treat as an effect. There is no justification in predicating an effect of a cause, but that is what we are likely to do when we have explained the color of an object. We are justified in predicating color of the object that is there, but, if we explain that the object, made up of electrons, is the cause of the color, we have taken this relation out of that of predication. It is when we do both abstract for the sake of predication and for the sake of explanation, and assume uncritically that this is the same abstraction, that we have set up a mental content—in one sense of "mental." For we have in the one case merely held off one characteristic of the thing from the rest of the thing, while in the other case we have set up an independent thing, which is the condition of the characteristic and of which it therefore cannot be a characteristic. It is then put into a mind, and the relations by which it is connected with the objects which are its so-called causes are made to connect it with the object as mental associations. The object so constructed can have the characteristic as a quality, and it can be predicated of this object.

The specious present is, then, that within which are present not only the immediate abstracted sense data but also the imagery of past and future experiences taken out of their place in the acts which they imply. It is a real duration, but this duration has no relation to the completion of these acts. These experiences belong to the reconstruction to which a later response will take place. They belong to the beginning of a later act. As such they are in a present.

They do, however, lie within acts which we call those of thought, or reflection. And reflection takes place by means of significant symbols, and significant symbols carried back to their origins prove to be gestures, i.e., parts of social acts through which individuals adjust their conduct to that of

others. They become symbols when the act which they preface is aroused as an attitude in the other individual. They become significant symbols when the individual that uses the gesture which calls out such an attitude in another calls out the same attitude in himself. When a gesture calls out a certain attitude not only in other individuals but at the same time in the individual who makes the gesture, we refer to this attitude as the meaning of the gesture, or symbol.

Reflection, then, is a type of action in which the individual in conversing with others is conversing also with himself and is able to call out in himself the same sort of a response which he calls out in another. He carries over the mechanism of co-operative conduct with others into his own conduct. It is this mechanism which enables the individual to isolate that in the act which lies in the individual from the completion of the act, and thus to distinguish the specious present from the future and the past; but it is important to recognize that the mechanism by which this is accomplished is that of the act, with its implication of perceptual objects to which the individual responds.

In this conduct the future values of things are represented by the attitudes which these symbols arouse. The attitudes may be very specific and concrete, as when we actually shrink from a distant dangerous object, and this attitude is recognized as imagery of the conduct which actual contact with the object would elicit, or when we find ourselves in empathy assuming the aspiring attitude of the walls of a cathedral. As a rule, however, the vocal symbols of "dangerous" and "aspiring" present such generalized attitudes that we could describe them only with a readiness to avoid or to stretch upward, and these descriptions lie in our experience only in the words with a vague sense of readiness to respond. This readiness exhibits itself toward other vocal symbols whose underlying attitudes are consonant with those which these terms arouse. In any case, in these so-called mental situations that are constituted by our conversations with others or with ourselves (a form of social conduct which we call reflection), the future of actual or possible conduct is repre-

sented by symbols and their answering attitudes which appear in the immediate experience of the individual. They bring into the experience of the individual the surrogates of the objects which would complete the acts which the individual initiates. It is a represented future and constitutes this a specious present, for the conduct of conversation is going on in a perceptual world. In the ongoing act things are what they are, and the future is in the objects, not in the individual; not until for some reason or another we start to reflect on the objects is it taken out of them and transferred in representation to the so-called mind, i.e., to reflective conduct in the individual. In ongoing conduct past and future meet in the duration of conduct. Something of the past and future are there, and the objects extend them before and after until a question arises which brings them into reflection and representation.

D. IMAGERY

Two questions suggest themselves that may be referred to in passing. The first has to do with imagery. It is an experience that takes place within the individual, being by its nature divorced from the objects that would give it a place in the perceptual world, but it has representational reference to such objects. This representational reference is found in the relation of the attitudes that answer to the symbols of the completion of the act to the varied stimuli that initiate the acts. Bringing these different attitudes into harmonious relation takes place through the reorganization of the contents of the stimuli. Into this reorganization enter the so-called images of the completion of the act. The content of this imagery is varied. It may be of vision and contact or of the other senses. It is likely to be of the nature of the vocal gestures. It serves as a preliminary testing of the success of the reorganized object. Other imagery is located at the beginning of the act, as in the case of a memory image of an absent friend that initiates an act of meeting him at an agreed rendezvous. Imagery may be found at any place in the act, playing the same part that is played by objects and their

characteristics. It is not to be distinguished, then, by its function.

What does characterize it is its appearance in the absence of the objects to which it refers. Its recognized dependence upon past experience, i.e., its relation to objects that were present, in some sense removes this difference, but it brings out the nature of the image as the continued presence of the content of an object which is no longer present. It evidently belongs to that phase of the object which is dependent upon the individual in the situation within which the object appears.

E. SPATIOTEMPORAL CHARACTER OF OBJECTS OF IMMEDIATE EXPERIENCE

Even when we consider only sense data, the object is clearly a function of the whole situation whose perspective is determined by the individual. There are peculiarities in the objects which depend upon the individual as an organism and the spatiotemporal position of the individual. It is one of the important results of the modern doctrine of relativity that we are forced to recognize that we cannot account for these peculiarities by stating the individual in terms of his environment. This is what has been undertaken by a physiological psychology. The physiological system of the individual is stated in terms of the physical world which the individual is said to perceive. If the spatiotemporal world of perception can be stated in terms of absolute extension, there may seem to be no objection to presenting the organism of the individual in the same terms; but if the very structure of that world is for the exact sciences dependent upon the relation of the individual to his world, we do not find in the analysis of the physical world the terms in which the individual can be stated, if that statement is to do justice to what is peculiar to the individual. This conclusion is not affected by the imperceptibility of the spatiotemporal differences between the worlds of different individuals, as physics and biology deal with them. Other differences owing to the relativity of the world to the individual are enormous. It has been the

assumption of science that such relativity disappears when we bring organisms into the terms of the analysis of the environments by the exact sciences. If in principle this is not the case, we are estopped from assuming it in considering the more flagrant differences. The determining character of the individual in the nature of the object is effaced when we have reduced him to those abstract physical terms in which those peculiarities no longer appear.

The so-called sensuous characters of things disappear when we have stated them in terms of electrons, and these sensuous characters of things are dependent upon the presence of the structure of the organism of the individual. What we obtain is an abstract statement of conditions under which these characters appear; in other words, we get an explanation of them, not an analysis of them as they are. The so-called psychological analysis of these characters deals with them as they are in the individual, not as they are in the object. Nor can we simply return them in their psychological form to the object which has been stated in the explanation of an abstract physical science.

These characters have actually emerged in the objects and not simply in the individuals, and our statement must include them as actually belonging to the object in the perspective of the individual where they exist. One thing that this certainly involves is according to the objects the future and the past which belongs to them in the perceptual world, as over against the knife-edge present which the exact physical sciences have set up as the ideal of measurements. It is only in the useful fiction of that present that things are made up of physical particles, for the complete contemporaneity of the particle with ourselves in our effective occupation of space implies the loss of all the distance characters. These distance characters separate us from the object not only in space but also in time. The distance is spatiotemporal. In terms of conduct it involves movement toward the object and the ultimate experience of contact and manipulation. If that contact experience is at the moment of its appearance in distance experience, it is in the implication

of the act's being performed and the ultimate contact experience attained. The ultimate experience involves not only contact. It involves also manipulation, that is, the potential crumbling of the object into continually smaller parts. The contact experience through the action of the hand becomes also a distance experience. We advance from the whole to its parts. An ultimate physical particle is the end of the road. It is, therefore, functionally determined and represents the point at which the analysis in the act stops. In the world at an instant we have annihilated all these distance characters which separate us temporally as well as spatially from the objects. This is possible only in so far as the acts are completed in the representation of the individual, and this involves the attitude of the contact experience which belongs to the completed act. It involves also that the effective occupation of space by the physical particle should appear in the attitude of the individual, that of resisting his own pressure in contact and manipulation. The attitude of the individual is also the attitude of the particle: the individual in so far places himself in the thing, and in so far attains the complete contemporaneity which is the ideal of the world at an instant of the physical sciences.

In this situation the individual represents himself in the same terms of physical particles. He can become a part of the world at an instant only in so far as he does this, but in doing it he is in the same manner abstracting himself from durational experience as that in which he abstracts the rest of the world. What goes on in the whorl of electrons in the central nervous system has the same fictional reality as that which transpires in Betelgeuse. From the causal standpoint it enables us to determine the conditions under which the experiences will occur, under the hypotheses of science, and these hypotheses, as hypotheses, bring back logically the future which the knife-edge present has eliminated. It is only in representation that the world exists in the specious present, and it is only in the fiction of our exact sciences that it exists at an instant. To repeat what is implied by representation: it is the identification of the indi-

vidual through the imagery of pressure with the distant perceptual object, so that the temporal character of spatiotemporal distance disappears, and the object acquires the immediacy of the sense of the effective occupation of space which belongs to the individual.

In immediate experience objects are there with the future value which conduct involves. In some degree, which approaches zero in so-called moral certainty, expectancy accompanies all perceptual experience. All objects are affected with futurity and are in memory with the past. The reality of the object is not present; it is to be or has been. To such objects affected with futurity distance qualities belong. They do not belong to objects which are in the world at an instant. To objects in the past memory imagery belongs; they are what we remember. These images do not belong to them in the specious present, or in the world at an instant, for they inhere in objects that are past, as distance qualities inhere in objects in the future. Abstracted from their objects in the perceptual world and taken simply in their relation to the individual who initiates the act, they are called psychical, more especially when the conditioning or causal relation is set up between them and the physical situation which appears in representation, and this situation includes the central nervous system. There is no sense of disparity between the color seen at a distance and the object that lies in the future. Nor does the relativity of the object to the individual detract from the immediacy of the object. The double image when the eyes are not successfully focused has no tendency to detach the colored form from the object. It is only by an unnatural route that relativity leads to a view of the psychical nature of the experience. So long as the act is ongoing, there is no metaphysical speculation in the eye that sees.

F. CONTEMPORANEITY AND THE SPECIOUS PRESENT

Contemporaneity is an affair of the specious present. It involves at least a momentary pause in ongoing action and the relation of different objects in the landscape with reference to

continued action. The goal of that action is in the future, while over against this the immediate landscape is in the present. Before definite action takes place, any object may be the goal, or all objects lie in the specious present. The specious present is the immediate field conditioning possible action. Its presence lies in the persistent relations which render possible a group of possible responses. In this sense they are all copresent with the individual, but when action resumes the goal lies in the future. The cogredient world answers to the organization of response with reference to any possible action. A moving object within that field, if it is an object of attention, introduces an attitude of adjustment. With every change of position of the object, there is a suggested congruous reconstruction of the landscape. The degree of reconstruction depends upon the scope of suggested responses which the moving object entails. In the case of terror the whole landscape is confused, while a moving object at a distance leaves the field of immediate action unaffected.

The organization of action with reference to a specific goal determines what will be the order of intervening events between the individual initiating the act and the attained goal. Every alternative act answers to a different time system, for it involves a different set of events. Each object assumes a different date. If I do this, that object will succeed the other; while, if I do the other thing, these objects may remain contemporaneous, while another set will fall into successive relation. We are continually facing varying temporal perspectives. The answer to the question whether these different perspectives can be made temporally congruent depends on the discovery of some act, such as counting some series of events which is uniformly recurrent, in all possible time systems answering to all the perspectives, within which the spatiotemporal succession of events in one perspective will have a one to one correspondence with that in another perspective. Such an act is the counting of the seconds on a watch. The set of events succeeding one another to the eye of the passenger in a railway train are in a one to one correspondence of spatiotemporal relation to the events succeeding

one another to the eye of the man watching the train from the station platform, when each relates them to the second hands of concurrent watches. The landscape moves at the same rate as the train. In the same fashion one assures one's self of a congruent spatial landscape by the exact correspondence between the perspective of an object seen at a distance and that of the point from which this is viewed, when seen from the position of that object, and one obtains the assurance by the use of the measuring rod which remains in contact experience unchanged in either spatial perspective. In either case one depends upon a counting process of a temporal or spatial unit which remains uniform in the different perspectives, and the discovery that the summations of the temporal or spatial wholes, which correspond to one another in the different perspectives, agree. The watch or the revolution of the earth thus gives an absolute time, while the measuring rod gives an absolute space. It is, however, necessary to further analyze the assumptions involved in the concurrent watches and the permanent spatial unit of the measuring rod. In the case of the watch or the revolution of the earth, we assume that there is an absence of all causes which would make a difference in the movements of the wheels or of the earth. We assume, furthermore, that we can find a field that is at rest with reference to it, i.e., a specious present in which an individual would inhibit all action momentarily at least, and thus have a field of possible action with reference to which all possible action would take place. The experience of this field is, then, so abstracted from all change in itself that changes which take place with reference to it mark off portions of it which are not affected by them. Yet, as experiences, rest and motion imply each other. One implies that which is marked off by the other. In the case of the concurrent watches either there is implied a specious present within which they both exist and are seen to be concurrent (an absolute Newtonian time, a divine sensorium) or else we project the specious present of one individual with his time system into that of the other and remark the uniformity. The passenger and the station agent see each

other's watch as the train goes by and thus authenticate the record. We are implying a momentary identical specious present. The representative of the absolute time has been found in the unchanged position of the fixed stars and has been abandoned with the recognition that there are no fixed stars—and we have no other approach to a divine sensorium. As our problem has to do with identical units of time and space in the system that is in motion and that which is at rest with reference to it, we cannot wait until the train has pulled into a station and then compare watches. This would not assure us of the uniform unit while the train was in motion. The assumption of a momentary specious present within which the watches may be compared as the train flies by, does by implication stop either the train or the landscape, as illustrated either by Zeno's question as to where the arrow is when it is in motion or by Einstein's analysis of what is involved in the most accurate signal that could be given of simultaneous events in two such moving systems. What comes out of this analysis is that any object which is moving with reference to a field of rest, a specious present, will have certain spatiotemporal relations to other objects which are moving with it, and that these relations will be different from those which these objects will have to each other if they constitute a field of rest, a specious present, and the other system is moving with reference to it. Enormous relative velocities are necessary to make these discrepancies possibly perceptible, but they are involved in any instance of such systems moving with reference to each other. In other words, units of time and space which would be uniform if both systems were at rest will not be uniform if they are moving with reference to each other. Another fashion of stating this is that events which will be contemporaneous in one system will not be contemporaneous when their dates are fixed by light signals to another system which is moving with reference to the first. Contemporaneity has to do with the succession of events upon one another. The telegraph poles are successive events to the man in the train; they are contemporaneous to the man on the station platform.

If this be stated in terms of light signals, it comes to this: that, if we take into account the velocity of light, the light signals from one pole will reach the man at the station at the same moment as those from another pole. Again making allowance for the different distances which the light must travel from the different poles, to the man in the train which is hurrying toward the poles the light has shorter distances to travel in reaching his eye than the distance between the poles for the man at the station. But the time has been marked off by the passage of the equidistant telegraph poles, so that to the man at the station the time period on the train must be longer because, the distance having shrunk, the time interval divided by a smaller divisor must give a larger quotient.

In the analysis given above we have succeeded in abstracting time from space and space from time. The basis for this abstraction is the specious present. In this situation one inhibits all responses of movement toward or away from the objects within the field of rest, the cogredient set, and there remains the actual or possible movement of some object or objects with reference to this field. The objects in this field are physical objects, i.e., they are things contact experience with which is represented by our attitudes, and in these attitudes is the resistance of the object with which we come in contact. The experience is one that is identical with that of the resistance of the organism. It is the experience of contemporaneity. The act is representatively completed, and the temporal content is abstracted from it. But this temporal content can only be gotten at by motion, in which the temporal and spatial phases return to their concrete union in conduct. The time that is squeezed out of objects through inhibition and representative identity is marked off by motion and measured by uniformly recurrent motion. Motion in a field of rest returns the futurity that belongs to things, while it presents to us the abstractions of timeless space and spaceless time.

It is this actuality of time in perceptual experience, inhering in things and indubitably present in even the specious present,

which relativity has brought back into the abstractions of science.

Time is, then, the experience of inhibited action in which the goal is present as achieved through the individual assuming the attitude of contact response, and thus leaving the events that should elapse between the beginning and the end of the act present only in their abstracted character as passing. In the presence of an indefinite number of such physical objects in the surrounding field, the relation of these events to any one act is blurred into a general succession of events abstracted from any one series. It is rendered definite by breaking it up into the events or separate steps of acts which take place with reference to this field. These may be overt acts or pulses of attention directed toward imagery and the significant symbols appearing in reverie and the inner conversation called thought, or toward recurrent physiological processes. In these, spatiotemporal unity is restored, though it appears only in bodily experiences. It constitutes a specious present because, on the one hand, physical identity with distant objects gives functional contemporaneity, while the acts that are going on involve the actual concrete spatiotemporal happenings. If we regard these happenings simply from the standpoint of the generalized abstracted time, they become bare events emptied of all except their successive passing. In full action this abstracted time appears only as the sense of relative temporal extensions. In one direction we move toward the scientific ideal of the world at an instant, while in the other we move toward the heightened temporal intuition of a Bergsonian picture of the world.

Of fundamental importance is the recognition that the fixing of a specious present, a cogredient set, determines what events will be successive and what will be contemporaneous. The customary illustration of this is that given of the man in the railroad train and the man on the station platform. It has been noted that, if we assume a uniform velocity of light, the spatial and temporal units by which we measure abstracted spatial and temporal magnitudes will be different in one set according as

they are viewed from within that set or from the other, though these differences would be imperceptible. As long as the units remain the same for perception, we have for all intents and purposes an absolute space and time built up out of these uniform units, i.e., a Newtonian situation.

It will be noted further that the question of the different values of the units of time and space implies that the individual in one cogredient set not only carries out measurements from his own standpoint but also by direct observation or through signaling (the import of which is his taking the position of the individual in the other cogredient set) compares a magnitude which is normal for the other set with the magnitude of the same extent from the standpoint of his own perspective. The phenomena of relativity would not exist if the individual in the train could not regard the surrounding world from the standpoint of the station, and vice versa. Relativity as an experience is the finding of the contemporaneity of different events, from the standpoint of the different perspectives, in the case of the same group of events, and then noting that the effect of this is to make the units of time and space differ, according as the individual uses it in the other set from the standpoint of his own perspective or from that of the other cogredient set. He must be able to adopt the point of view of the other and then his own and to compare the results as he takes now one standpoint and now the other. It is not a comparison of each with an absolute standard but amounts to the following: he measures a distance with a yardstick within the other set—that which is moving—as if it were a part of his own, i.e., moving within his own which is at rest, and then transferring himself to the other consentient set he measures the distance as it appears there and compares the two, finding that the yardstick and the second are, respectively, shorter and longer in the one than they are in the other. The process of signaling, and the crucial importance of the velocity of light in Einstein's formulation, seem to have a relation to this experience of relativity. For relativity does not exist except in this experience. We do not in this experience discover

something that exists in a world that is independent of the experience. The differences in the measurements of the same extents from the two standpoints of the different consentient sets exist only as far as the same individual is regarding the magnitude now from the standpoint of one set and now from the standpoint of the other. In so far as he retains consistently the one standpoint, no such difference has meaning. We may contrast it with the different accounts given of a physical object seen from different points, e.g., the much-worn penny of recent speculations. These can all be translated into the object seen from the point at which the intersecting diameters are equal. This translation in terms of a perspective geometry does not involve a change in the value of the units of measurement as one shifts from one standpoint to the other. Or, rather, the individual immediately without reflection translates the distorted magnitudes of visual objects seen at different distances and at different angles of vision into those of vision within the range of contact and at right angle to the symmetry of the object. He does not indifferently place himself in either perspective and regard the other as a distortion of the one he is occupying. There is an absolute standard constantly present in experience into which translation is constantly made. The changes owing to temporal perspective lie beyond the range of direct perception. Velocities have to approach that of light, and where these are reached the results can only be presented indirectly, as in the case of the alpha particle. We can conceive of situations in which we were surrounded with objects moving at the rate of 70,000 miles a second of which we had clear visual images, and of a similar translation of their dissymmetry, provided there were in experience some normal relative velocity with which objects moved with reference to one another, and which would provide the norm of unit values. Complete rest would not provide such a norm because this can exist in experience only in the presence of change. In any case, changes in spatial, temporal, and mass units, owing to the relative velocities of moving systems, exist only in so far as the individuals, whose positions

are those answering to the symmetry of the systems, each regards the other system as moving in his own and at the same time his system as moving in the other system at rest with reference to his own.

In current statements of electromagnetic relativity this does not seem to be the case. We set up our own system as absolute and state that, when an alpha particle moves with a velocity approaching that of light, its spatial, temporal, and mass values have changed. The assumption is logically on a par with that involved in the Fitzgerald-Lorentz hypothesis of the foreshortening of the diameter of the moving object which lies in the direction of the motion. We do not present the answering assumption that the alpha particle is at rest, while our system is moving with reference to it with a velocity approaching that of light. We figure out a result of the application of the principle of relativity without getting the experiential value of relativity. It is perhaps needless to say that this is unavoidable. When we present an airplane as moving at a velocity of 120,000 miles a second and assume that we can see the foreshortened diameters of its occupants in the direction of its motion, we can readily place ourselves in the airplane and see the corresponding foreshortening of the diameters of persons on the earth which are passing us at the same velocity. It is, however, practically impossible to place ourselves inside an electron in a Bohr atom and present the rest of the universe as moving with reference to it, if it be regarded as at rest. It is difficult enough to present a Bohr atom. It is hopeless to undertake to present a system of the universe whose elements are so moving that the electron in question may be regarded as at rest. We are forced to abandon rest and motion, which are experiential, and approach the scientific fiction of the world at an instant, but including in the conception of the physical particle its temporal dimension.

G. THE EXISTENCE OF TEMPORAL PERSPECTIVES

The abstract conception of the world at an instant implies a timeless space and, if it were a tenable conception of the uni-

verse, would eliminate the phenomenon of relativity. If at this point there were no time, there could be no temporal perspectives, and, if reality could be located at such a temporal zero point, the experiences of relativity would become appearances of a unique situation which would be just what it was in an instant of no temporal spread. The impossibility of such a conception, which eliminates not only time but also motion, takes us to the functional import of the conception as an approach to a limit that does not belong to extension, either spatial or temporal, but to certain characters that exist as limits in physical series. The point and the instant are, then, the spatial and temporal implications of such a character at the limit of its series. Such a point-instant would answer to the Euclidean definition of being without magnitude in so far as further division would reveal no further approach to the character that is the limit in the series. But something further is demanded, and that is position. Position in a cogredient set, a specious present, is attained in so far as distances and times are used to locate a physical element in the passing field. Four co-ordinates locate the physical element. If we realize that this set is but one of an indefinite number of sets within which the element is related to different objects and events, position is lost. If, however, we conceive of all the possible time systems with their corresponding spatial configurations, within which this element as an event would belong, another meaning is given to position. From the standpoint of the cogredient set, position refers to the set of numerical values of the four co-ordinates which fixes the so-called point-instant uniquely in the set. With the abandonment of any fixed set—absolute space and absolute time—goes the loss of units of space and time which have the same value from one set to another.

The essential point is found in the simultaneity of moving objects in a distant field with the perceptual objects of the contact field. The nonmoving object in the cogredient set, as before stated, has a future value owing to its distance, which is in some sense abstracted through the inhibition of the acts

which the distance object arouses. Through identification with the distant object, contemporaneity appears. The distant object as exercising the individual's attitude of pressure is temporally coincident with the individual. It is contemporaneous with the individual at the moment. If the perceptual relation involves a measurable period, the contemporaneity belongs to the moment of the individual's contact experience and antedates the completion of the perceptual process. This becomes appreciable in the case of the sound. Except with reference to stellar bodies, it is not appreciable in the case of light. If one assumes an appreciable time period in the perceptual process of vision, identification with the distant moving object introduces a problem.

While the body is at rest, the contemporaneity of the distant object involves no complication with the temporal character of the perceptual process. Its thereness, an essential part of the thereness of the percipient individual, gives it durational identity with the perceptual individual in his specious present, or this present expended in memory. Its contemporaneity is unaffected by the time involved in the distant process. When, however, the distant object is moving, identification with the percipient individual still leaves the location of the object in question. On the assumption of a light of infinite velocity, the object in the world at an instant would be where it was when it was seen, i.e., the identification of the individual with the object which carries with it contemporaneity would locate the object where it was at the moment at which it is seen. But light has a finite velocity. When the individual identifies himself with the object, it is no longer there. If he receives light waves from two different parts of an object moving toward or away from himself, the distance between these portions of the object will be theoretically foreshortened by the fact that the waves will have a different distance to travel from the two portions of the object. He will not be able to correct this foreshortening by simply subtracting the difference in the distance which the light waves have to travel, for he must also take into account the

distance that the body has traveled since the light wave has left the object. The distance between him and the object is steadily decreasing or increasing in the time during which the light wave is traveling toward him. He is advancing to receive the wave or moving away from it. He could calculate this only if he knew the velocity of the object, but he can know this only on the basis of locating the object in his distance field, that is, by the contemporaneity of the light waves from the moving object and stationary objects which it passes. This contemporaneity ignores the fact that the object is moving, that the distance which the light wave travels from the stationary object to the individual is different from that traveled from the moving object to the individual.

What is evident is that the measurement cannot be from the moving object but must be from some point in the field with which the moving object is coincident. It is the identification of the individual with this object that gives the basis for the estimate of distance. If the individual identifies himself with the moving object, not only does the difficulty of determining the actual extents in space and time arise but the identification invites at once the formation of a cogredient set with the moving object as at rest. One can only determine the position of the moving object by reference of it to other objects that keep the same relations to it, i.e., one can only determine the position of the moving object within its own space. One can mark the positions within the space of the cogredient set at rest through which the moving object passes, but it is impossible to locate the moving object in these positions, for its motion contradicts, but accepts, the spatial relations of other things contemporaneous with it, as constituting a field capable of maintaining position, thus passing its motion to what had been at rest.

There are two reasons why this difficulty does not arise in experience. The first is that for all velocities which do not approach that of light the failure to reach contemporaneity between the moving object and the object at rest which it passes does not appear. If light had an infinite velocity, the situation

which was presented above would not arise. The distance which the light has to travel between the individual and the moving object would not differ from that which the wave travels between the object at rest and the individual. In the second place, scientific thought for the purposes of exact measurement sets up the ideal situation of the world at an instant. The effect of this is to eliminate motion. For all purposes of determination of position the moving object is where it is in the same sense as the object at rest. From either of these standpoints the experiential fact of relativity disappears. So long as one can consider the moving object as contemporaneous with the object that it passes, there is no temptation to give it position in its relation to other objects in its own consentient set. It is only when one finds one's self in such a situation as that of the rapidly moving train that the invitation arises to such a passage from one consentient set to the other. In immediate experience one either organizes the landscape on the basis of one's own consentient set, in which case the objects seen succeed one another, or else one identifies one's self with the consentient set of a stationary landscape, and the different positions of the train succeed one another. It is the latter attitude that is dominant because the motion of the train is felt. Even in such transference no complications arise for immediate experience because the velocity of light enables us to maintain the contemporaneity of the moving object and that which it is passing. If we were dependent upon sound for the location of distant objects, this problem would arise, as is evident from the changing note of the whistle of a train rapidly approaching or receding from us.

H. VISUAL SPACE AND CONTACT SPACE

The question forces itself upon us, "Why has the velocity of light this critical position in the doctrine of relativity?" Visual space is not the conceptual space of science, for in visual space parallel lines meet. The conceptual space of science seems to be abstracted from the congruent spatial relations of contact experience. Our immediate translations of visual experiences into

those of the region of contact experience take away any resistance to the use of conceptual space. Should not the presentation of the situation of relativity in terms of physical particles in conceptual space remove the problem of the ambiguity of contemporaneity of events when looked at from the standpoint of different consentient sets which are in motion with reference to one another?

If we translate the problem from the form in immediate experience in which it has been stated into that of conceptual space abstracting from the experience of vision, we have sets of events which are occupied by physical particles. These events must be recognized as extended in time as well as in space. The space of a consentient set of events will thus be recognized as passing, that is, the variation of the temporal co-ordinates of all elements in the set will be identical. Within this set which is at rest, the co-ordinates of space of the objects at rest will remain the same. The result of this will be that the spatial structure and the spatial locations of the physical particles will, with the identical variation in temporal extent for all events in the consentient set, continually repeat itself—the fundamental fact in congruence. The fact of motion within such a set will be represented by a location of a physical particle (or particles) which does not repeat itself with the change in the time co-ordinate. The events which succeed these events will not have the spatial co-ordinates of these events when there is the same variation in the time co-ordinate. However, events which by this definition are in motion may retain the same relative relation to one another, that is, in the nomenclature of relativity they will constitute a consentient set. Are there standpoints from which they will repeat themselves?

Repetition implies the retention of the same spatial co-ordinates with the variation in the time co-ordinate. This will not be the case if the moving set is regarded from the standpoint of the co-ordinates of the other set. This other set is not only consentient but also cogredient. A cogredient set is one which is the extension by distance experience of the im-

mediate contact field of the individual. This contact field primarily includes objects which are not only those of vision but also those of contact. It is important to recognize that the body is one of the objects within this field in the same sense as objects with which the body comes into contact. The body is delimited by the same process by which these objects are delimited. It is true that the experience involved in the delimitation of the body includes the peculiar epidermal and muscular and joint surface experiences, but these peculiar experiences, while serving to characterize the body as a peculiar object, do not give to it a primary reality as distinguished from the other objects of contact. The thereness of the objects surrounding the body is essential to the thereness of the body as a physical object. This is illustrated by the fact that we locate objects at the end of a pencil or a cane held in the hand in the same sort of experience as that of the finger. Other objects in this field are not projections from the peculiar bodily experiences, but all objects within this field stand upon the same logical level, including the body as a physical object. The peculiar characteristics of the bodily object distinguish it from the other objects in the field and create a category of nonbodily objects, but this distinction has no bearing on the spatiotemporal thereness of the two categories. The primary experience of contemporaneity appears in the relation of the objects in this set. What one sees, one feels. The act has in it the continuity of passage. When, by the action of the hand, vision terminates in contact, and this and the bodily experience are there, the temporal phase of passage is abstracted from the whole. It is this experience within this contact field which we denominate as contemporaneity.

It is in the extension of this contact field to that of the whole range of vision that a translation takes place which involves in some sense the projection of the contact experience into the distant object. The seeing of objects at a distance in like dimensions with those in the immediate neighborhood is the translation. This includes not only the enlargement of diameters but also the correction of the distortions of visual projection. How-

ever immediate it appears, its actual or potential operation is evidenced in the continual experimental testing of the structure of the seen object. This testing takes place not so much by comparison of the seen object with visual imagery of it within the contact field as in the preparatory adjustment of the system to contact reaction to it in advance of actual manipulation. The immediate assurance of the form of the elliptical penny is in the present readiness to pick up the circular coin. So far as this translation is a projection, it is of the contact situation, not of motor imagery; but there is an element of motor attitude in the adjustment of the organism to the contact reaction which would ensue if we had reached the object, and this is not a single attitude. There are various possible reactions dependent on the interpretation of the distance experience. It is the final organization of these tendencies which for the time being validates the interpretation of the distant object involved in our conduct with reference to it. It is when these adjustments involve the actual innervation of muscular tracts that the experience called empathy appears, for it is then that the individual as distinguished from the other physical objects even in the contact field is involved. Back of this adjustment of the individual to the distance stimulation in terms of readiness for future conduct lies the extension of the contact field to the visual field that transcends contact. This certainly involves some change in the visual form of distant objects in terms of the contact field. We do see things to some degree as they would be in closer neighborhood, and we see them in some degree as having the symmetry of this neighborhood, and in this vision what is termed "visual imagery" enters. This varies with individuals and with the same individual. Those whose imagery is entirely or predominantly motor presumably are less subject to such actual translation in visual content. With them the adjustments to possible conduct with reference to distant objects would functionally replace the visual translation. This extension of the contact field to that which transcends contact does

not involve reflection, though interaction of the two fields is implicit.

The interaction becomes explicit at the point at which the future conduct of the individual, when the contact object is reached, determines present conduct. In this case the different possible reactions when the contact field is reached carry the contact field into the distance field, and functionally the individual with this field is identified with the distant field. The situation is problematic in that there are different possible contact reactions which inhibit one another, and whose organization is the condition of present conduct with reference to the distant object. The test of the successful plan of present conduct is found in the organization of competing future acts.

It is in this situation that the individual as a physical object appears, and it is here that projection, so far as it takes place, has any reality in spatial experience. It implies a spatiotemporal world that is there and cannot be used to account for the world that is there. Psychological analysis arises in the isolation of the elements in the objects which call out possible responses in the individual, and these responses in the individual as an object are in the same logical field as these stimuli. It is the contact field projected into the distant field, when possible later conduct serves to determine the present response. So far as these responses are dependent upon their organization in the individual, their existence is in him. The problematic future exists there as determining the present. On the other hand, the conditions of that conduct are there in a present which thus stands out over against this future. These conditions are the characters in the object, which are abstracted from the object through the inhibition of conflicting tendencies. They are, therefore, in this situation isolated from the objective field and left in their relationship with the individual. Otherwise they exist in the object in its relationship to the individual. It is not the relationship to the individual that renders them subjective, for in all perspectives of experience this relationship is there. It is the loss of the objective character, following upon the in-

hibition, that leaves them in the field of the individual over against a still unproblematic objective field.

Recurring now to the world at an instant, there are two factors here that are involved, contemporaneity and those series in the theory of physics which approach limits, i.e., whose occupying events imply an ideal limiting event or instant. Contemporaneity, as we have seen, is the temporal expression phase of the projection of the contact field into the distance field, carrying with it the individual with which the contact field is cogredient. The behavioristic necessity for this is found in the control over the act which preparation for ultimate manipulation exercises. Within this contemporaneous cogredient set, which is a duration, physical theory approaches a limit of duration, implied in the limit of the dynamic series, to locate the object that is moving within this set. While this procedure enables physical science to attain any required degree of accuracy in locating the moving object, it may not arrest the motion. The duration never is reduced to an instant. The object never is at a certain location.

We can, however, reduce this discrepancy to any required minimum of accuracy, and assuming the practically infinite velocity of light, i.e., that the moving distant object is where it is seen, we can within ordinary tellurian distances determine the velocities of moving objects within the cogredient set to any required degree of accuracy. Within this degree of accuracy we reach contemporaneity not only of bodies at rest but also of moving objects; but the moment that we take into account the finite velocity of light, we are estopped from locating the object at any visual place in the field of rest, for during the period within which the light wave travels to the eye the body has been moving, and the only method we have of ascertaining the distance it has traveled is through the velocity which we are undertaking to find out. The manipulatory attitudes which constitute the moving object a physical thing can be referred to the moving object only in so far as this contact field moves with the moving object. If one takes seriously the task of locating

moving objects in a cogredient set at rest with a recognized finite velocity of light, one can maintain the physical reality of the moving object only by entering into the consentient set of that object, which at once transfers the motion to that set with which one was cogredient. Even in this case the visual experience of the object moving in the field at rest persists. While taking into account the velocity of light, one can assume that half the length of time it takes a light wave to travel to the moving system and back to the system at rest is the amount that must be subtracted or added in determining what events are contemporaneous in the two systems. The question is whether events that are simultaneous in one system will, by the application of this constant, be simultaneous as seen from the other system. Within each system there is a situation of rest. Within a situation of rest, light waves reaching a point simultaneously will not reach a point simultaneously in a system that is in motion with reference to the first, if we recognize the finite velocity of light. As long, then, as we project the contact field into the distance field in the constitution of the physical object, there will be in the two systems not only a difference in the simultaneity of events but also a difference in the dimensions of objects. Larmor and Lorentz discovered that to give general validity to the Maxwell equations in electrodynamics certain transformations depending upon velocity were required affecting the constants of time, space, and mass. Making use of these transformations, the differences in temporal, spatial, and mass characters in objects in a system moving with reference to another system are calculated and agree with the results of observations, notably in the Michelson-Morley experiment.

These transformations have been adopted as those which serve to translate the temporal, spatial, and mass coefficients of an object moving with reference to a cogredient set, when we regard the velocity of light as infinite—i.e., when we assume these temporal, spatial, and mass characteristics of the moving object to be those which a distant object at rest would have

(for, when an object is at rest with reference to the cogredient set, the finite velocity of light can be ignored, there is no temporal perspective, and we see the distant object as it would be if it were in the contact situation)—from the values which the object would have if we were cogredient with it and the former cogredient set were in motion.

In the case of the spatial perspective we see things as we would handle them, while this is possible in the case of the moving object only if we place ourselves so within the object that it becomes the cogredient set of the observer, unless we assume an infinite velocity of light. If we assume the infinite velocity of light, the spatial, temporal, and mass dimensions of the moving object will be the same as those of the object at rest. There will be no temporal perspective, for in that case there would be absolute simultaneity of all distant events, at the moment of their perception. In other words, there would be an absolute time.

We correct the spatial perspective by seeing things as we would handle them. We can correct the temporal perspective only by placing ourselves in the moving object so that a cogredient set may arise with reference to which what had been the cogredient set at rest is now in motion. This can be done only with the greatest difficulty so far as sensuous presentation is concerned, while it is relatively easy when we are ourselves in motion to identify ourselves with the field which is at rest, within which the motion is taking place. In the moving train, we readily pass from the attitude of a person at rest, with the landscape sweeping by him, to that of an individual in a train hurrying through a landscape at rest. There is no demand in human conduct for the first transfer of attitude, while the second is of the highest importance. However, for all purposes of human conduct the velocity of light may be regarded as infinite, so that the transfer does not involve any translation of the coefficients of space, time, and mass.

The space of geometry is an abstraction from that of the contact situation. Here we have congruence not only of objects

felt but of the seen objects with those that are felt. It is, however, an abstraction, for in the contact experience there are still the predicates of up and down and of right and left, and in the so-called conceptual space of geometry we are able to define points, lines, surfaces, and solids which do not exist in the space of contact experience. It is, however, of importance to recognize that motion and rest cannot be presented or defined without reference to an individual who determines a cogredient set, and that this dictum of relativity that rest in one system is motion in another involves, therefore, this same reference to an individual, and that the transformations of the coefficients of space, time, and mass are of values which suffer these transformations in one set from the standpoint of another, while the same transformations are implied of the corresponding values in the latter from the standpoint of the first. The mutuality of this relationship implies that the individual in one system so places himself in the other that he can regard this as at rest and vice versa. Relativity can only exist in the relation of cogredient sets in which the same individual occupies now one set and now the other in his presentation. Otherwise there would exist simply a series of disparate statements which could be brought into no relation to one another. This capacity, then, of identifying one's self with different cogredient sets is central to relativity.

It is not, however, peculiar to relativity, in its restricted sense of a mathematical theory of the physical world. It is involved in a common world, and then in the distinction between this and the experience of the individual which is contrasted with this, as well as in the distinction between the situations, or experiences, of different individuals when the same events appear in different spatiotemporal cogredient sets. In all these cases is found the mutuality which characterizes relativity.

In the common world we find the individual not only reducing all his visual perspectives to the congruences of contact but also identifying his own congruences with those of others. For in the reflective attitude in which such congruences are determined the individual exists in experience only in so far as he is an object

of his own conduct, and he becomes such an object only in so far as he uses the processes of social conduct and acts as another toward himself. Nor is this confined to social objects in the strict sense of the term. His organism is an object to him in so far as he acts upon it as other objects act upon it. The resistances of objects other than his own organism are those that respond to his own pressures. The experience of physical things is of a common effective occupation of space in which the physical content belongs equally to things and the organism, and it is only as it belongs to things other than the organism that it belongs to the organism. In the psychological analysis of this experience we find the individual identifying himself with the object and pressing against the body, as one hand presses against the other; but this identification has reference to objects which have an existence which is independent of it. The psychological analysis does not reveal the physical reality of the object. It presupposes it. The psychological analysis is not a discovery of the reality of the object but a method of assigning the characters of the field of experience in so far as they are dependent upon the relation to the individual. The qualities of things, e.g., the secondary sensuous qualities, exist in the relation of things to organisms of a certain structure. Without such a structure the particular colors or odors would not be there. On the other side, the statement of the object in so far as it is determined by the field appears in the physical analysis. In each case the statement has to do with the same object, so that an inevitable parallelism arises. This psychological analysis is of a piece with the biological analysis of objects such as food, which appear as such when an animal form is there, such as an insect that is able to consume cellulose. The presence in the alimentary system of the insect of bacilli which can disintegrate the cellulose constitutes this a food. For other forms it is not a food. It is the mechanism of the insect which determines whether this object shall exist or not. The same parallelism arises when the cellulose is regarded from the standpoint of its physical and chemical characters, as being a part of an environment

which is independent of the insect. For every food character of the cellulose there exists a purely physical statement of the object which is quite independent of the insect and its life. Cellulose as a food is relative to the insect. For another animal—man, for example—it is a building material, another object relative to his life-process, answering to which there appears a somewhat different environment. Finally, there is the generalized physical environment of scientific research, in terms of which all these different environments may be stated, but this is relative to man as a scientific animal. Now, if there were but one animal and it had but one occupation, there would be but one set of objects. Relativity would not appear. There would still be possible an analysis from the standpoint of the organism, but, if there were no other occupation but that of eating, the analysis from the standpoint of the organism would be coincident with that of the environment, though there would be in the environment the negations which answered to the absence of food. Relativity involves mutuality. The object is relative to one form or to one type of conduct only in so far as it is another object in another situation. The generalized physical environment of science has been assumed to provide a situation within which such objects could be absolutely stated and defined. In the first place, however, the scientific concept has come more and more to take on the form of a rule or principle for the correlation of events in different situations in attaining measurements, and, in the second place, the recent doctrine of relativity has removed the absolute character of the spatial, temporal, and mass determinations of the physical object. Objects in one cogredient set have different spatiotemporal and energy characters from the standpoint of another cogredient set, depending upon the relative velocity of the movement of the sets with reference to one another. There is no situation within which absolute characters can be determined. What seems to remain is only the possibility of translating the values which objects have as experienced from one set into those which they would have in another.

Within the field of our everyday experience, in which we may consider the velocity of light as infinite, the congruences of contact experience provide us with a world of identical objects into which we can translate our visual perspectives, not only those of a single individual but those of others. It is of importance that we should not confuse the relativity of one situation to another with the distinction between the psychological and the environmental analyses. In the latter the dependence of the object both upon the individual and upon the field appears and the statement of the object from the two points of view, while in the former there appears the difference in the object owing to its entering into relation to another situation in which it is another object. Thus cellulose is building material for the human situation, but, recognized as food for the termite, it is food to be dipped in creosote, or to be replaced by other timbers. It is still food, but food relative to the building situation. From the standpoint of the food process of the termite it is as building material withdrawn from consumption. In this case we do not find the parallelism of psychological and physical, but correlation between the objects now in one situation and now in the other, with the recognition of the shift in characters which the object suffers as it is found now in the one and now in the other. In this case, however, we seem to find an absolute situation, within which the object may be found and to which it may be referred in either case. As a physically determined piece of wood, of definite chemical structure, it may be interpreted either as food or as building material. But wood so conceived is imperfectly known until it becomes such a chemical and physical structure that it may be recognized as an object in one of a thousand different processes. This structure is not so much a thing as a principle of organization from which a number of different objects may be deduced. As a thing it is an object that is simply there, not reflectively analyzed.

In psychological analysis we refer the object as stated in terms of the individual, and stated in terms of the environment, both to objects which are not reflectively analyzed. Both

the food of the termite and the physical and chemical structure of the stuff are referred to the stick of timber that is there. In the same fashion we refer the colors, feels, tastes, and odors of an object, and the physical counterparts of these in an apple, to the apple that is there. This analysis can only take place in a world of such objects that are there and that are not disturbed by the analysis but are, in fact, presupposed by the analysis. The apparatus of the psychological laboratory is simply an extension of this surrounding world that is there.

In the analysis of relativity there is no such world that is there back of the objects in the different sets, or situations. On the contrary, the objects that are there are there in the different situations, and the analysis simply enables us to correlate them by transformations. The transformations imply that the object is cogredient to the same individual now in one set and now in the other. That is, identity of the objects is attained not by reference to an object that is there back of both statements but by the possibility of the object being an object at rest and an object in motion, and it can be neither of these except over against a percipient individual; and it can be the same object only so far as it is over against the same individual.

I. EXPERIENCE AND NEWTONIAN RELATIVITY

The Newtonian relativity met this difficulty by setting up an absolute mass in an absolute space and an absolute time that were there, and these were identified with the world that is there for psychological analysis. The later theory of relativity has removed these, but in doing this it has thrown the doctrine back upon this possibility of the individual placing himself now in one and now in the other set.

For the vast majority of experiences the Newtonian definition of the object that is there in terms of absolute space, time, and mass is adequate. It is only when we reach the subatomic world and the problems gathering about ether, together with the two or three experimental tests of the Einsteinian doctrine, that these definitions become inadequate.

The adequacy of this definition consists in the identity of the spatiotemporal and mass coefficients of the thing that is there—say, the piece of timber—and the same coefficients of the termite's food and of the builder's beam. As has been already indicated, the moment that we take seriously into account the whole physical and chemical structure of the termite's food as food, and the tensile strength of the cellulose particles and fibers of the beam as a rafter in a house, we find ourselves correlating the termite's food and the rafter, not identifying the food and the rafter. In so far as it is food, it is creosoted or replaced, and, in so far as it is creosoted or replaced, it is food barred from the termite. The tensile strength of the cellulose fibers have a different significance for the termite from that which they have for the builder, and the chemical structure of the cellulose has a different significance for each. One can correlate these characters, so that, taking their significance in each object, he can read out their significance in the other and obtain a principle of structure from which he can deduce food or building material. If now this principle of structure is referred to the stick of timber that is there, one has an identical thing that is either food or rafter, possessing a group of characters or a nature which has both significances. If we adopt this logical procedure, we have the Aristotelian concept in which we abstract both from the food value and from the building value of the stick of timber and conceive of it simply as wood. Or we can concentrate attention upon the principle of structure and obtain a rule or formula which permits of the deduction of both significances, thus not abstracting from these but involving them in the universal principle. If we take the latter logical attitude, the reference to the wood that is there is arbitrary and unessential. There is no reason why a piece of wood that is simply there would be endowed with such characters.

The logical justification for the identification of that which is there with the two objects, which are not identical but are subject to a one to one correlation, is that a Newtonian definition in terms of space, time, and mass can be made of this,

which also holds for all intents and purposes for the termite's food and for the builder's rafter. As long as this definition holds, we can say of the piece of wood that it is both food and rafter, and it has the vast convenience that this thing that is there is the object with which we deal technically and economically. It is the technical and economic considerations, as well as various others, which draw the lines about the object that is there; but the Newtonian definition gives it not only exactness and measurability but also a formulation which holds common conditions of action and of science for all the other objects which arise in the different relative situations.

What the doctrine of relativity has maintained is that the space, time, and mass characters are not identical in the different situations, so that the object that is there may not, strictly speaking, be identified with the objects in the different situations but becomes an object in its own situation, if it is subjected to reflective analysis, and can only be brought into relation with the other objects through correlation.

It is this which distinguishes a thoroughgoing relativistic analysis from the psychological analysis. In the latter we are frankly stating the same object now from the standpoint of the individual organism and now from that of the environment—I am here abstracting from the metaphysical implications which have been attached to this analysis. The thing may be stated in terms of food, or it may be stated in terms of the tree that has produced this cellulose tissue which in relation to the termite becomes food, or again the object may be stated in terms of the so-called physical stimuli which answer in the thing to these characters regarded from the standpoint of the sentient organism. The thing that is there is subjected to analysis, but it does not itself pass away in the analysis.

The object that is there disappears in the analysis of relativity, except in so far as it can be stated in terms of events spatiotemporally extended and in the formula for the translation of the space-time distances of these events from one another from one sentient set to another. That which occupies

the event is relative to the situation determined by the percipient individual.

With the Newtonian object identified with the object that is there, the psychological analysis seemed to reveal a reality of this object that was universal and absolute, while by this very identification it elevated the statement of the object from the standpoint of the individual into an independent entity, a consciousness, whose states as entities paralleled the physical entities. With the analysis of relativity the object that is there returns to its normal position in the situation determined by the individual and his environment. Its reality is that of the situation, to be interpreted in the light of the transformations which set up one to one correspondences between objects and their characters from one situation to another. The time, space, and mass differences of objects from one situation to another are so infinitesimally minute in everyday experience that we can regard these characters of objects in the different situations of different individuals as to all intents and purposes identical, but we are estopped from abstracting these characters and setting them up as entities that have independent existence outside their situations. We cannot say that we have discovered entities that are independent of experience—in other words, independent of the situations of percipient individuals and their cogredient sets—but we can assert that like percipient individuals would have, in an enormous range of experience, experiences which, in these Newtonian characters, would be measurably identical with those which we have or which we can present to ourselves. On the other hand, we are equally estopped from erecting a consciousness and its states into entities which have a parallel reality that is independent of the situations within which they belong.

There is nothing that is *recondite* in this. An apple that is well flavored to one individual may be insipid to another. We find no difficulty in this apple being both well flavored and insipid in these two situations. One eats it or throws it aside, as well flavored or as insipid, and assumes that he would find

in the physical structure of the apple, if his physical analysis could be carried far enough, that which answers to each character, answering also to his palate, but not for that reason being located in the consciousness of the individual. He expects to find the identical Newtonian characteristics in the apple whether well flavored or insipid or both, and so calls it the same apple; but, if he carried his physical analysis far enough, he would find that the same situation that obtains over against the flavor of the apple obtains also over against the Newtonian characteristics. Just as there is correspondence between the relation between the physical characteristics of the apple and the palate, so there is a correspondence between the time, space, and mass characters in the cogredient set of one individual and those in the cogredient set of another individual. We state the first correspondence in terms of so-called concept of flavor, but instead of this being an abstraction from the different flavors it becomes a principle of relationship between the chemical structure of the fruit and the reaction of the taste buds in the mouth, from which the very differences in flavors could be deduced. There is, then, a correspondence set up between the physical and chemical structure of the apple and the organs of taste in the two experiences which becomes the scientific concept of the flavor of the apple. It is the identity of this principle of relationship in the various instances which constitutes the unity of the concept. Given a full acquaintance with this structure and of the structure of the nervous apparatus in the individuals, one could translate from the flavor in one case to that in another. The translation, however, of the well-flavored apple into the insipid apple would not be a substitution of the one for the other in the sensuous experience of the individual. It would be an apple of one flavor to one which was of another flavor to another. In other words, it would be of a well-flavored apple which is in a sense distorted as insipid to another. Such an apple is evidently different as each experiences it in its relationship to the other's palate. The apple is one or the other according to the indi-

vidual in question, with a sense of aberration in the experience of the other.

It is exactly this situation that obtains in the two cogredient sets that are moving with reference to each other, where the velocity is assumed to be sufficient to lead to a corresponding shift of the Newtonian characters. Only in this case we are dealing with characters which are assumed to be constant in the experiences of different individuals. The shifting of characters carries with it, therefore, a paradoxical effect which does not obtain in the other situation. The paradox seems to lie in the confusion of the object that is there in our psychological and physical analysis with the set of contentless events whose positions and space-time distances from one another can only be stated in formulas capable of being given actual spatial and temporal contents in different cogredient sets, which is all that is left of the Newtonian object under the analysis of relativity.

The corresponding paradox is escaped in the case of the relativity of the flavors of the apple by the identification of the apple that is there with the Newtonian object, which seems to be identical in the two experiences. Here, we say, is an apple which is identical in the two experiences. It appears to one to have one flavor and to the other to have another. We do not say that here is an apple which is well flavored but insipid to one, and an insipid apple which is well flavored to another, according as the experience is that of the one individual or of the other. Berkeleian idealism is just an attempt to substitute, in this field of sensuous experience, the object of a relativistic analysis for the object that is there in the psychological and physical analysis. Johnson's refutation of this idealism is a simple affirmation that, in making the psychological and physical analysis, we do not abrogate the object that is there but presuppose it. In our statement of the apple in terms of so-called sensations, on the one hand, and in terms of the physical stimuli of these sensations, on the other, we are recognizing the mutual relation of the organism and its environment in the object; but, so far as we abjure metaphysical implications, this

recognition does not impair the object that is there. For the psychological analysis undertakes to trace the relationship of objects which are not questioned in their validity to the individual. The refinements of this analysis enable us to correct the inadequacies of the object as it exists in the experience of the individual, but only upon the evidence of objects present in experience.

The psychological and physical analysis starts from, works with, and comes back to, a world of things that are there, and which could not be abandoned and still permit of the analysis. The analysis of relativity relegates the objects of this world, and the world with them, to the consentient sets which are relative to percipient individuals and substitutes for them the formulas by which the characters of one set may be translated into those of another, but these formulas do not constitute objects. These can appear only in some set or sets. What is, then, the relation of these two to each other? As long as we can keep the Newtonian object with its absolute spatial, temporal, and mass characteristics, it has been possible to maintain the two types of analysis in the same field. Customary doctrine has accepted a world of physical particles, in terms of space, time, and mass, absolutely determinable, and therefore identical in all sets or experiences. Short of these congeries of such particles, the world could be presented in terms of the different experiences of different individuals. Each individual had, then, his different world, and, as these particles lie beyond possible experience, the objects in experience seem to be relative to the individual, but with an assumed dependence upon the absolute entities. The object in experience disappeared as an absolute object and was replaced by an absolute object that lay out of the reach of experience but was implied in it. The justification for this implication even from the standpoint of scientific analysis may be dubious, but it has been the working hypothesis of all scientific investigation, up to the appearance of Einstein's doctrines. The development of a scientific concept which is a principle of organization within a process rather than a set of com-

mon marks which belonged to the Newtonian object has weakened the value of the Newtonian object as that with which scientific knowledge deals, and relativity has given it the *coup de grâce*.

J. RELATIVITY AND SUBJECTIVISM

There is a distinction of fundamental importance between the relativity which has just been described as present in current psychological and scientific assumptions and that which belongs to the recent relativity doctrine. On the assumption of a Newtonian object, which lies outside possible experience and which is the real object which the object in experience implies, the object in experience becomes relative to the individual whose experience it is. This restriction of the object entirely to the experience of a specific individual is not at all involved in the doctrine of relativity. A number of individuals may belong to a consentient set. The same objects will be at rest and in motion for all who belong to that set. The same object is food for all animals with a certain digestive apparatus. In other words, this relativity is in no sense solipsistic. It represents a certain relation between the field and individuals. In so far as this relationship is identical, objects may be identical. A solipsistic relativity arises out of a doctrine of consciousness which identifies the object with states of experience of an individual. From this standpoint even likeness or identity of content in the object in the experience of two individuals would leave the objects distinct in their existence, though one might argue from such likeness or identity to some single object which both imply. An absolute idealism avoids this difficulty by merging all selves in an absolute self. Apart from this, however, if the uniqueness of the individual's experiencing includes the content of that experienced, there is no escape from this solipsism. It is a position which is readily assumed even inadvertently. There is so much of the object that does belong to the unique perspective of the individual, and the line can be drawn with so much difficulty between what is private in this sense and what is public, that

it is easier to relegate the object entirely to the consciousness of the individual and leave the common character of the object to habitual inference. To this should be added the convenience of consciousness as a receptacle for the so-called secondary qualities which cannot belong to the Newtonian object, and for the so-called imagery, so much of which is found in the object. The illegitimacy of the distinction between the secondary and primary qualities leads naturally to the doctrine that the sensuous content of the object is to be found in sensations which are states of consciousness of individuals.

However, while from the point of view of this use of consciousness, the distinction between the secondary and primary qualities proves illegitimate, and while it reduces the Newtonian object to a thing-in-itself which lies beyond the range of experience and thus abrogates the object that is there, which the psychological and physical analysis presupposes, both the distinction between the secondary and primary qualities (in the form of distant and contact experience) and the Newtonian object (in the form of the measurable contact object) have definite values in the psychological and physical analysis, and, if freed from the implications of this doctrine of consciousness, they do not abrogate the object that is there but give the basis for the relation of the object that is there to this analysis. These values are found in the conduct which the object that is there in experience implies. Color, sound, taste, odor, and temperature all prepare us for certain contact reactions, and within the acts which perception involves these contact experiences constitute what we call the reality of the object. To affirm that these secondary qualities are states of consciousness that induce habitual inferences to a Newtonian object that is not a state of consciousness, and therefore lies beyond any possible experience, is evidently to falsify the value of these characters of the object that is there. In so far as we bring the object that is there within the range of reflection, it has just these characters. Objects are spatiotemporally distant from us and are there in experience as such. We see, hear, smell, taste, and feel them, but principally

we see them, and this signifies, under analysis, that we are ready to move toward or away from them and that these motions lead to or away from certain contact processes which constitute the ultimate meaning of the act. The Newtonian object is a refinement of this object of ultimate contact, or manipulation. The object that is there has all these characters within it, but it is under analysis that they appear as characters and then are referred not to the object that is there but to the object of contact experience, which under scientific analysis becomes the Newtonian object. The object that is there is always at some distance; even when gotten into the hand it is seen or visible, and, pursued by the imagination or the apparatus of science, it is an object that has its location that belongs to a consentient set and is oriented in investigation by its spatiotemporal relations to the investigator. If we persistently abstract from its perceptual form, and define it rigidly in the mathematical terms of physical science, we find ourselves with the type of concept which serves to give not the content of an object in the sense of a thing that is there but rather a principle of organization from which an object may be constructed or deduced.

An object that is there at a distance existing in a field that is oriented with reference to a percipient individual has distance characters, and these characters are, in the field of human organisms, color and the other so-called secondary qualities. They belong to the object as spatiotemporally distant from the percipient individual. The simultaneity of the field at an instant has been already seen to be an extension of the experience of the contact field with its congruences, by means of attitudes which belong to the completion of the acts involved in perception. The simultaneities of colors, sounds, and the like are simultaneities not of things but of experiences of individuals, i.e., if we undertake to place the simultaneity in the colored or sounding objects, we can do so only by reverting to contact experience which these colors or sounds promise. The world is a world of hypothesis, however unquestioned the hypothesis may be. The world that is there, by which we test the hypotheses, is a world

of objects, all of which lie in the future, beyond the actual contacts of immediate experience. If we say that the colors and sounds are present actualities, we affirm them of individual experience not of the objects. The astronomer noting the coincidence of the star's light and the hair line across the object glass is noting experiences of his own, which are subject to his personal equation. He is in the field of psychological and physical analysis. The psychological statement presents those characters which, abstracted from the object, lead the individual to acts involving spatiotemporal distance. They exist, as abstracted from the object, only in the individual of whose acts they are the inception. The physical statement presents the outcome of these acts, but the outcome is hypothetical when abstracted from the object. Within the object the outcome is not there as ultimate result but as control of the process. The other bank of the ditch across which one is springing is the solid earth upon which one alights, in the physical statement. As an object it is the promise of that upon which one expects to alight, and as such a promise it controls the spring. In the physical statement it is the hypothetical extension of the solid earth upon which one stands. As object it is the future controlling the present.

Within the act in its immediacy there is no division in distance between space and time. Distance is spatiotemporal. This has been stated as the interval between events, but the event is already an abstraction from the act. It involves an analysis of the act, and this can take place only in so far as the act is itself an object. In a sense the object is in the act, but it is an act only from the standpoint of the individual, otherwise it is experience. The act becomes an object, then, when the individual in his adjustment to different things, i.e., in the attitude of inhibition, presents the object in terms of his adjustment. The rivalry of different acts throws the individual back upon the controls which the object exercises.

The object that is there at a distance in its immediacy is not a solid thing existing at the instant of the perception, for its

solidity is in the future or else is found in the attitude and imagery of the individual or in an inference. In its immediacy it is a control in the passing present of perception, determining the action of the individual. This passing of the present is not time, for time is a passage that is a whole which is broken up into parts and abstracted from those dimensions that persist when action is inhibited. It is out of this abstraction that these dimensions appear as space. In the immediacy of action all dimensions, spatial as well as temporal, vary with passage. Two characters, then, are involved in a temporal whole, which is time. One is the stoppage of the action toward or away from the spatiotemporally distant object which controls the action. The other is the extension of the whole passage of the whole act over the passage of the different stages in the act, in the relation which we call that of whole and part. In this fashion the temporal distance of things is squeezed out of action and becomes time, but as the action is estopped, it is a whole of passage only in so far as it corresponds in its parts with a passage in action that is going on. This matching (to use Whitehead's phrase) in passage of the ongoing action with that of the inhibited act is essential to the being of time. The inhibition takes place in the individual, and the matching must go on in the individual. Time and space, then, appear in the situations of organic forms, in their consentient sets, which are cogredient with them.

Such inhibitions belong to the situations of all animal forms. They live in landscapes, toward the larger part of the things in which they inhibit response, directing action to separate objects. However, this does not endow their landscapes with space and time as measurable entities, unless they are capable of matching in a one to one correspondence these extensions with elements of acts that are going on. This capacity belongs to human individuals. This does not render their situations subjective in their spatial and temporal characters any more than the presence of powers of digestion makes food a subjective experience of the animals that possess this power. Nor does it restrict these specific characters to the situation of one individual. The situation

is common to those individuals in which the matching agrees. In other words, the appearance of human individuals brings into their world ordered space and time, just as the appearance of organisms with eyes and ears brings colors and sounds. I am referring to the ordered space and time of our perceptual world. The so-called conceptual space and time of mathematics prove to be a principle of construction of ordered Dedekindian series which can be used for matching the spatiotemporal extensions of experience. If we undertake to set up an entity answering to this space-time, we find ourselves with events without content, to which position can be given only in so far as they can be conceived as lying in different consentient sets; but a consentient set implies some standpoint of a percipient individual from which its members can be regarded as retaining the same spatiotemporal relations to one another, and the distances between these events can be absolutely expressed only in a formula by which we can translate the space-time distances of one set into that of another.

The time that is squeezed out of the futurity of the distant object can be secured only by annulling its futurity, that is, by reaching a contemporaneity of the distant object with the individual. It is spatiotemporally distant from us, but it exists in the same present as that of the individual in his immediate contact field. In some sense the act must be present as completed. The act as completed implies a different object from the object that is there whose reality lies in its control over ongoing action. Its relation is not to the action by which one would reach or avoid the distant object but to the action that would take place if contact were already attained. We are already adjusting ourselves to the manipulation of the object. This object of manipulation is thus coextensive with the contact field of the percipient individual. We push this field out into the spatiotemporally distant world and capture it for the immediate present. It becomes contemporaneous. If we see the book as something to be taken up and opened, the mountain as something to be climbed, they are realities upon which this present tendency to

act could be exercised. The spatial distance remains. The temporal distance has been canceled, for the act within which the passage takes place is syncopated in the presence of the attitude which belongs to its completion, while all the steps in the act in the intervening landscape (also in contact terms as manipulatory objects) are there in spatial terms. They are there in some sense as the past of the completed act, and yet in so far as they are an extension of the immediate contact field of the individual they are contemporaneous. Passage taken out of the act appears in the setting-up in the individual of the one to one correspondence between these steps and the temporal distance of the object. It is a hundred steps or a hundred seconds to the distant book. Ordered space and time come into experience with the advent of individuals who assume the relationships just described with their fields, and with these come the physical objects that are defined and identified by means of them. These physical objects, then, are not objects that are there in the sense of immediacy. The latter are temporally and spatially distant and do not carry with them the value of contemporaneity but rather that of futurity. They control action that is taking place. It is these objects that have the distance characters of color, sound, etc., the so-called secondary qualities. It is only when the relation of these characters to the physical object is sought that the demand for their explanation appears, and we undertake to translate them into the form of contemporaneity and thus take them out of the temporal dimension in which they belong.

K. THE INDIVIDUAL AND THE SPATIOTEMPORAL

I have indicated the situation of human individuals in its character of spatiotemporality and consequent physical structure. I have also indicated the peculiarity of the human individuals which is responsible for this field, but this calls for further definition. This individual in the presence of various objects which invite to various responses, not only through the conflict of these tendencies inhibits the responses, but also through the extension of the contact field by imagery and the judgment of

perception introduces the contemporaneous physical object and, as we have seen, reaches a perceptual object which includes within it contact values that anticipate the conclusion of the inhibited acts—values which become abstracted and are defined in terms of space, time, and mass in the Newtonian object. These values are neither found in the object that is there in immediate experience nor in actual contact experience. This contact value of the distant object appears as the imagery and attitude of the percipient individual, or else as the inference in what is referred to as the perceptual judgment, and this inference has to be referred to the experience of the individual. This situation, then, differs from that involved in the object that is there. In the latter the object is determined by the relation of the percipient individual and his field or environment. The distant object is there not only as distant but as a control in conduct; not as a something that is contemporaneous with the percipient individual. It has been common to say that the distant object is the sensation of color or sound and, as such, contemporaneous with the percipient individual. This, of course, is to deprive it of its character as an object which it has in experience, or to give to the object as temporally and spatially defined mass characters which are responsible for the secondary qualities located in the individual, but which are not the color or sound which are the characters of the object that is there. This latter view is in so far correct that the object is contemporaneous only as we regard it as a physical thing (the Newtonian object under the refinements of scientific analysis), but it fails utterly to do justice to experience which sees and hears the object as there controlling our action toward what is temporally as well as spatially distant from us, leaving the experience of the physical contact thing to the outcome of the act, or to the so-called judgment of perception, that is, to implicit inference.

There are objects in the contact field of action. They are both seen and felt, but they are felt in such processes as that of mastication in which there is no reference of the seen to the felt. That which is felt leads on to other contacts. That which is seen acts as a control in the process of securing the food. The whole

experience is a passing experience, in which that which is later abstracted as spatial passes as genuinely as that which is abstracted as temporal. There is here no motion as distinguished from action, for motion implies a field of rest that is contemporaneous within which change that embodies passage takes place. In action, what is to the observer rest (the moment in which action seems to cease) is either adjustment through relation to distance objects that are there or passing experiences of relaxation, in which one experience leads on to the next, and in which the field passes with the experience. The body of the percipient individual is not an object as a whole. Different parts of the individual are seen and felt, or are both seen and felt, but there is no experience in which the entire individual appears as an object. That there are peculiar characters that are common to these parts of the body of the individual does not constitute them a single object, for that arises only in so far as the individual acts with reference to it as a whole. It is only as the objects are fixed in a field of contemporaneity that the individual can be fixed as a persistent whole within such a field, and only as the hypothetical content of the physical object is so identified with the attitudes of the individual that the individual presses against the body's resistance to the object, can the percipient individual become an object in the field of physical objects.

It is evident that it is the formation of the physical object which is responsible for the appearance of the individual as an object, since it brings contemporaneity and also brings the possibility of the distinction between rest and motion, and the separation of space and time, and thus constitutes a new environment answering to the new individual. In other words, contemporaneity can arise only as distant objects which are future in their import can be brought hypothetically into the contact field, and so become physical objects.

The world of action that precedes this is a world without things. The ultimate contacts in action are affairs of food, sex, protection, warmth, rest, and sleep. In this world conduct does not abide with contacts but passes on to the completion of the

physiological act. Contacts have no preferred status in the process, except that of immediate proximity to the goal.

The world of action provides no contemporaneity, for contemporaneity is an affair of a world in which the fixity of certain environmental relations renders possible the appearance of identity in the passage of events, that is, gives the conditions of the date of an event. The situation in the world of action which answers to contemporaneity is that in which the individual finds himself in a landscape whose stimuli are so balanced that they inhibit one another and allow of successful action with reference to some one distant object. The objects whose stimuli are inhibited provide the landscape within which action takes place, but their function in action is that of the preservation of the balance of the individual, the orientation of the individual in his movement toward or away from the distant object, and the carrying-out of the immediate contact processes by which motion, eating, fighting, sexual contacts, care of the young, protection, and the other physiological processes which are the culmination of acts are achieved. In none of these processes does the individual abide with the object as a physical thing, i.e., as a mediate something within the act to which he returns as an identical contact experience, however varied have been the distant experiences which have led up to it. There are, then, two characters in the physical thing that distinguish it from the distant object. It is a mediate identical goal, over against varied distant experiences, and it possesses a content, especially in manipulation, which conveys the resistance of one part of the body to another—what may be called an effective occupation of extension. It is essential that this contact experience should be of import in the activity of the individual and that it should enter into varied acts, in other words, that this identical object should become an implement. It takes up in a manner the whole act into itself. It can be seen, and it is at the goal of the process at which the act is completed.

It is the fact that the individual abides with the physical object, i.e., that he neither passes on to the completion of a physiological process which contact implies nor finds in the

physical object an immediate step to a later act, which provides the situation for the development of the thing. That what is neither an immediate step in nor the completion of an act should be an object for the individual is evidence that it belongs to another world than that of action. As an implement it takes its place in another act, but it is an act of another character, one in which for the time being the contact goal has lost its physiological value and has come to embody uses. That an object should have a use in conduct implies that the object is not simply a stimulus but has in some manner taken up the rest of the act into itself, and this is possible only in so far as the individual who carries out the act becomes an object to himself. It is the type of conduct which is called conscious, or self-conscious, in which the individual responds to himself as a stimulus. This is a different situation from that in which parts of the individual excite him to action, as in the case of a sore foot or an irritation of the skin. These parts are, after all, only objects which act as stimuli and are not at all necessarily parts of a self. When the body has become a physical object, this has evidently taken place, for then the physical body as a whole arouses to action in its relation to other physical objects, but the unification of the body does not take place in action. One does not get outside of it, so that it appears as a stimulus to any sense as a whole. A situation in which this could take place would be one in which one's action toward an object should become a stimulus to the individual to respond as the object acts toward the individual. Then, in acting with reference to an object, one would be also acting with reference to one's self. In manipulation this seems to take place. The pressure of one part of the hand upon a hard object is in response to the feel of the object, but this pressure produces an additional feel of resistance of the object to the opposing side of the hand, which leads to a response of grasping the object more firmly. One's action is that of the object itself. One places one's self, so to speak, in the object, and so calls out in one's self a response for which one is responsible in so far as one acts in the role of the object.

PART III
COSMOLOGY

XVI

ONTOLOGICAL ASSUMPTIONS

A. THE ONTOLOGICAL ASSUMPTIONS IN CONCEPTION AND IN CONDUCT

THE distinction between mind and matter and that between consciousness and the physiological organism is a distinction which is drawn between contents which may appear on either side of the line, if we draw the line within the field of immediate experience. The objects about us which belong to the world of things, as distinguished from that of our thought, have meaning—in other words, just the content which on occasion we make the object of our thought, our ideas of things. The imagery that furnishes the mind in our presentation of what we will undertake, the results of future conduct, the past experiences that come before memory—all have their place in our perceptions of the objects in our surroundings. There is no object of vision or sound or any distance perception which does not carry some image of contact experience, and other imagery in varying degrees enters in to fill out and organize that which we see. On the other hand, any object of the world of experience which lies outside the field of thought may as regards its content be an object of thought. The possibility of considering even extension in visual and contact experience as a state of consciousness, whatever the justification for the assumptions that accompany the consideration, at least makes it evident that the stuff of things in experience lying outside of mind can pass into mind under appropriate conditions, for here we have not merely significant reference but the stuff itself of things. The same assertion can be made in reference to consciousness and the physiological system. The muscles, bones, nerves, and other tissues of the physiological system appear in immediate experience as stuff that must, when recognized as perception,

also take on the nature of consciousness. And *per contra* the pleasures and pains and emotions may in immediate experience appear as parts of the objects. The tooth aches, the fruit is delicious, the landscape is beautiful, and the play is intensely interesting. Remaining within immediate experience, there is no content that may not be in mind or in the world that for the time being we distinguish from mind, nor which may not be in consciousness as distinguished from that which for the time being we regard as the condition of consciousness, or in the physical and biological world that is regarded as the cause of our conscious experience. There remain objects which lie beyond the range of experience, and indeed many which by definition lie beyond the range of any possible experience, since they make up in theory the mechanism of experience itself and could not give rise to the physical processes which register themselves in sense perception. Here lies a world about us which we can think about, but whose stuff cannot enter into the experience itself. A world of electrons, for example, is made up of elements which by their size are beyond the range of a vision which had any conceived degree of magnification. For the electron is too small to subtend a ray of light. The elements of the molecular structure of the nerve ends of the sense of touch could not themselves be felt. If we take into account only the meanings of these objects, their uniformities of change, and the relations of the elements to one another, it would appear that these contents could be both in the mind and in the world. Their contents as actually occupying any sort of a space, whether that of a distance experience or that of a contact experience, would lie by definition beyond any possible experience. They would be conceptual objects but not perceptual objects, as defined. We make significant reference to them, but as things part of them at least cannot be in the mind as they are supposed to be in the world. But this world, of course, is not the world of immediate experience. How far this is an entirely justifiable account of this situation will be the subject of later discussion, but, proceeding on this assumption, we find also a different distribution of contents in

the fields of consciousness and of the physical and physiological mechanisms that are considered the conditions of consciousness. Here, also, the laws and relations of the physical and chemical changes which the elements of the organism undergo can be in the mind, but their stuff as that of possible perception cannot be said to be in consciousness. If this world of elements which by definition lies beyond the range of a possible perception is the real world, then it cannot be in consciousness, though certain characters such as its uniformities and relations can be in both. It is such a real world that by definition lies beyond the range of experience that constitutes, on the one hand, the problem of epistemology and, on the other, that of parallelism, the problem of mind and body, of consciousness and the physiological organism.

In considering the content of these objects that lie beyond the range of possible experience, it is proper to remark that the attitude of the individual who assumes them still leaves them objects with both a distance and a contact value. These are involved even in a conceptual space which is assumed to be different in its character from the sensuous space of immediate experience. A physical object of any sort always implies a relationship of the object to the observer at a distance and a contact experience which sets up a one to one relationship between the points of the one experience and those of the other. It is the fact that the contact extension may be conceived of as placed at a distance, and vice versa, that gives rise to the process of magnifying the indefinite division. While, therefore, the actual vision cannot be carried even in imagination beyond the range of the mechanism of vision, an abstract conception of some distance perception with the like relation to a contact experience remains, and even in the space of mathematics determines the development of conceptual space. In his most abstract analysis the mathematical physicist is still operating in a field where he has objects which in their essential structure are objects of an experience that logically fits into that of our immediate experience.

B. ONTOLOGICAL ASSUMPTIONS IN EXPERIMENTAL SCIENCE

The problem of the cause of perception lies in the assumption that the determination of the conditions under which the perceptual object appears can be regarded as the cause of the so-called states of consciousness, which have been identified with the perceptual object. All the conditions determining the appearance of a colored object at a distance will include those which are the conditions of the vibrations of electrons, of radiations, of photochemical processes in the retina, and of the processes which take place in the central nervous system. Those processes which take place in the physiological organism are generally conceived of as the immediate causal factors of the experiences which appear as the sensuous characters of the perceptual object—especially those within the central nervous system. There is, however, no ground for the separation of the series of events which precede the organic processes from these processes. The whole situation is of a single piece. A mechanical statement of this situation must be carried throughout, and the physical organism occupies no peculiar position. It is a physical object on the same level with the objects that are spoken of as exciting it. What lies back of this separation is the mutually determining character of the organism and the environment. If this is overlooked, from the standpoint of the idealist either the environment is regarded as dependent upon the mind of the individual or the so-called mental processes are made dependent upon the physical processes.

The scientific view of the universe demands a reality which is independent of the individual and his environment, and it has achieved and maintained such a universe by lodging what is peculiar to the environment of the individual in his consciousness. Each new scientific hypothesis in regard to the structure of the universe is an individual achievement and belongs to the environment of that scientist, in so far as he brings it into harmony with the scientific world of discourse, with its experimental test, i.e., in so far as the scientist takes the role of the generalized other. Back of his achievement lies the assumption

that this hypothesis may be set aside by a later hypothesis. Science, it is true, does not assume an actually given universe which is independent of the individuals and their environments or environment. But science does assume the existence of such a universe which is never actually given but which is the presupposition of those that are given, and it assumes that the characters which appear in the given universes of scientific hypotheses will with different interpretations appear in every new hypothesis. Science does not assume a transcendental universe of things in themselves which cannot appear in experience; its existent real universe is assumed to consist of things that appear in experience.

What are the logical implications of this scientific assumption of a real universe which is independent of individuals and their environments? There are two clearly distinct phases of this reality in the scientific assumption. One is that the hypothesis, when properly formulated, must be universal in its application—the assumption of the uniformity of nature. It is the assumption upon which rationalism has always built. The other is the assumption upon which empiricism has rested: that it is possible to so state a hypothesis that it can be tested for its applicability by experiment or observation. There is an obvious relation between the two. It is only upon the assumption of the uniformity of nature that one can advance to the reliability of a hypothesis from the results of observation and experiment.

We can conceive of a nature that would not be uniform. A world that is not there we cannot conceive of. The individuals and their worlds are the presupposition of all thinking. The uniformity appears in experience. The character of universality arises out of the social attitude of the individual toward the world. In so far as the individual takes the attitude of the generalized other toward the object there emerges an object that is universal. Whether this generalized character persists and maintains itself depends upon experience, but any other character which replaces that which experience substitutes will be in its nature a universal object. The actual uniformity of nature

is the experienced translatability of one object into another object, i.e., the continued restatement of objects in the form of new hypotheses on the basis of uniformities which enables us to conceive of them as made up of molecules, atoms, or electrons. The new statement enables us to present the older object in terms of the later hypothesis. We can take up the Ptolemaic world into a statement of the Copernican.

There are, then, two characters of the objects and the worlds that they imply which belong to the successive hypothetical structures within which they appear. For example, animal species under the pre-Darwinian zoölogy were classified in many respects as they are at present. The conception of fixed species, however, has been given an entirely new character under the doctrine of evolution. The apparent finality of the species that we meet can be explained by the same hypotheses which account for the origin of species. All that the earlier biologist brought under the conception of the fixed nature of species takes its place otherwise interpreted under the doctrine of evolution. In the second place, perceptual objects remain the same. The seen and felt form of the animal is identical whether we assume that the form was created as it appears at present or whether we assume that it has developed out of the vital processes as they took place in changing environments. Of course, there are changes even in these characters. We discover new facts which eliminate series of happenings and introduce others, and our perceptual objects themselves change as we come to understand the implications of their characters. We see more than we could with less knowledge, but these changes are not so considerable as those which take place in our interpretation of the history of animal forms. But, in so far as observation has been careful and controlled, there will always remain whole sets of events which remain the same under any theory, however different the account we give to ourselves of the grounds for these events. It seems to be true that these series of events are only identical as they are stated in terms of perceptual observation. Thus the identities in the positions of the planet Mars,

whether these are presented under a Ptolemaic or Copernican theory, are stated in the actual observations of the astronomers of the planet. The experimental results of chemical doctrine will be the same under any theory only in so far as they can be stated in terms of the scientist's observation. All else in the different interpretations may be changed. The actual weights as found on the scales, the actual readings on the electroscopes, and the positions of stars on the photographic plates remain unaffected by the hypothesis adopted in explanation.

These data of immediate experience, however, which in observation and experiment remain unaffected by the hypothesis, are neither the perceptual objects nor the objects of scientific theory. They are certain abstracted agreements and disagreements of certain characters, certain successions of such characters. The perceptual objects which are the carriers of these characters would vary with the individuals and the period by which and in which they were perceived, and the scientific objects which embody the hypotheses of science vary with the development of science. In the intelligible uniformity of nature we imply the translatability of these objects from one world into another. That is, we can always explain why objects in one world are different from what they are in another. The data of observation and experiment do not constitute a world of reality which is independent of men and mankind. Such an extreme positivism does not answer to this implication of an independent world which we are discussing. We imply a universe with just the contents which our perception and scientific theory supply.

The question then becomes, "What meaning, if any, attaches to the assumption that there must be some such universe which we never reach in our perception or theories, which is independent of all the worlds of perception and scientific theory, that would explain all of them and yet would not transcend them in the sense of being of a nature which could not appear in perception or scientific theory, and would be independent of

observation and perception and thought and yet would itself include these? Is such a universe implied?"

In the first place, the logic of scientific method applies to the solution of some immediate problem in which the test of experience as given in observation and experiment refers not to such an ultimate universe but to the world of experience in so far as this is not involved in the actual problem with which the scientist is occupied. The experimental test can never be in terms of a universe which is and will be subject to no reconstructions. What is approached in observation and experiment is such an abstraction from the perceptual object and its world that it will be translatable into any hypothetical universe. Thus we determine the velocity of oil drops under carefully supervised conditions. Their velocities, proving to be multiples of one unit velocity, support the assumption that they have secured as many electrons. But the observation under experimental conditions is as far as possible so made and formulated that it would remain an established ratio, no matter what world of scientific theory might obtain. Thus it was possible for the Greek astronomers to take over the tables of observations of the Mesopotamian astrologers and magicians and make them the basis of their mathematical astronomy, since the statements of the relative positions of the planetary bodies with reference to one another were sufficiently abstracted from the magical world in which the Magi made their observations to allow of their being translated into the world of Alexandrian mathematical astronomy, and they can, through the medium of the Greek tradition, be translated into a modern world of astrophysics.

The experimental datum, its scientific form, on the one hand, and its factual location, its imbeddedness, in the different perceptual worlds in which it is or may be realized, on the other, constitute the real problem disguised in the assumption of a perceptual universe which is ultimate and independent of the perceiving individual. Its ultimate character is expressed in the assured reference to a world of experience that is not questioned in the immediate problem with which the scientist is occupied.

Its independent character is expressed in its universality which implies its applicability to any hypothetical situation and abstracts from any specified perceptual world.

I will restate the problem in the form in which it appears in scientific practice. An event such as that of the disintegration of a chemical element in radiation appears to be in contradiction to the character of elements. The experimental facts, or data, are carefully determined and repeated by a number of competent scientists. While the problem goes very deep into the doctrine of chemical elements, it does not affect the greater portion of the definitions of the elements. Elements can still be distinguished in their fundamental characters. Whatever hypothesis in explanation of this disintegration is advanced, there is a body of undisputed facts, i.e., objects appearing in the investigations of physicists and chemists, embodying interpretations of accepted doctrine, by which it is possible to test any theory explanatory of the new facts. This is the body of unquestioned facts or objects embodying chemical and physical doctrine which is not disputed in the real world of the scientist, and by which he is justified in trying out any new hypothesis.

However, it is within just this field of at present undisputed fact that some new problem will appear tomorrow, and the facts ascertained today and legitimized by their agreement with the world that in some essential point is now called into question will be disintegrated. The real world by which the test is made is not an ultimate reality, nor does the scientist assume that it is. On the contrary, as a research scientist he is eagerly looking forward to discovering discrepancies therein which will involve its reconstruction in new hypotheses. How exceedingly fundamental are changes in the real world of science, by which the scientist tests new doctrines, the history of discovery in the field of the physical sciences during the last half-century strikingly exhibits.

The idealist interprets this as the gradual approach to truth, or the reality that is constantly implied in the partially real constructions of scientific thought. If, however, the idealist's

position were correct, there would be no justification in the experimental method, for there could be no assurance in a reference of a hypothesis to a world of reality which is unreal.

The assumption of the experimental method is that the test is being made with reference to a world that is called in question only at the point at which the problem has arisen and that the conduct which the new hypothesis contemplates will take place within that world so reconstructed, if the test of experiment sustains the hypothesis. We are testing the hypothesis not by a world of ultimate reality but by a world within which we are living and acting successfully except at the point which has become problematic. With this corrected, successful conduct can proceed until new problems arise. If we questioned the faith of the scientist in his experimental method, pointing out to him that he was testing his hypothesis by a world which he expected to reconstruct tomorrow, his reply would be not that he had gotten hold of a body of data which he was confident did belong to a world of ultimate reality, for he is not confident of this, but that as long as he can act intelligently in his world, prophesying what will happen, cognizant of its laws, he can test his hypotheses by this world competently enough to continue his scientific conduct. The rational anticipation of results is his statement of the reality of his world.

This seems to me to be the point at which the pragmatic assumption that the perceptual world is there not as a cognizing experience but exists in advance of learning something about the world through cognition, comes together with the implication of relativity, as presented by Professor Whitehead, that the consentient set is there in so far as it is selected by the percipient event. The perceptual world is there in distance experience, dominantly visual. As such it is a series of invitations to conduct, by responses in which we have confidence. Stated in its lowest terms, we expect to feel what we see if we carry out the reactions which the vision tends to call out. But what we see is there where we see it and when we see it. That is the value of the experience, its import. What we see is spatiotemporally

away from us, and its thereness involves this spatiotemporal distance. If there arises a question as to its reality, we carry out the reaction and cognitively assure ourselves of what we then call its reality. If there is no such question, it is simply there.

The ultimate experience of contact is not subject to the divergencies of distance experience. It is that into which every perspective can be translated. The round solid coin in the hand is the ultimate fact of every oval of vision. It is a translation when a problem arises respecting the coin. Barring such a problem, it is the identical coin as we walk about it, and it opens from a straight line through all the ellipses into the circle of frontal vision. Evidently perspectives are there and are determined by the relation of the perceiver to the perceived. It is a falsification not only of immediate experience but also of optics to regard them as subjective. If the reality of them as distant objects in their relation to the perceiver is the contact object, then it becomes necessary to place them as symbols in another medium than that in which they abide as realities. In Berkeley's conception they are merely a language by which we read the reality of contact experience. But the world about us is not in contact with us. It is perceptually there where it is perceived, and the objective fact of its outline depends upon the percipient event. The perspective emerges out of the relation of the percipient and the perceived and is as objectively there as anything can be.

The same affirmation may be made of the secondary qualities of color, sound, taste, odor, temperature, and, under the assumption of analysis into more ultimate contact elements such as the physical particles of science, of contact experience. These characters emerge out of the relation of the sentient organism to its environment. They may, in the analysis of cognition, all be translated into the ultimate physical elements of an assumed ultimate contact experience. That is, we state these characters in terms of the physical processes and the physical objects and physical organism when we conceive of these in terms of atoms

or electrons. Stated in these terms all these characters disappear. There remain only the mass and occupation of space of the physical particle.

This seems to determine a fundamental difference between the visual perspective and these distance characters. In the case of the visual perspective the peculiar character that attaches to the environment because of its relation to the perceiver is one which not only remains when stated in terms of optics but finds its demonstrative theory in that science. In the case of the distance qualities of the environment, the characters of color, odor, and the like, when stated in terms of physics, chemistry, and physiology, evaporate as color, odor, and the like, to reappear as the redistributions of physical energy, which are in no sense dependent upon their relations to the perceiver. The physical vibrations of electrons are in no sense dependent upon an eye and its neural attachments, though color may be dependent upon the existence of a retina, or at least upon an organism endowed with vision.

The cases when so stated are not entirely parallel. The scientific statement of the perspective is in terms of the ocular experience which it presents in the formulas of projective geometry. The parallel lines that meet at the horizon are the visual lines in immediate experience. The color of immediate experience does not enter into the physicist's account of the vibrations of electrons and their radiation. The perspective is a distance character of the field and remains such in the scientist's account. The color as stated by the physicist is no longer in distance terms. It is stated in terms of physical particles and their energies as exhibited in motions, which in the scientific imagination are contact experiences.

When we give a geometric account of the perspective, we are still in the distance phase of the act. We have not completed the act and entered into contact with the object seen. When we give a physical account of color, we have come into contact, at least in imagination, with the colored object and analyzed it into constituent elements whose vibrations are the so-called

causes of the experience of color, which belongs to the distance phase of the act. In doing this, we have surrendered the determining character of the perceiver to his environment, so far as the distance character is concerned. If we took the same attitude in dealing with the perspective, we should place ourselves at the horizon, having passed over the distance involved, and would find the lines at exactly the same distance from one another as that which we determine at the *locus standi*.

The object seen is a distant object, even when we view it in the hands. The felt object is not colored as felt. It is true that in perceptions we see objects with characters that belong to our contact experience of them. We see things as hard or soft, as smooth or rough, but we do not the less distinguish between the characters that belong to them as at a distance from us and those that belong to them in our manipulation of them. Just as an object at a distance has a perspective value which is dependent on the relation of the eye to which the lines of light converge, just as there emerges an objective character in the seen object that is the resultant of the situation which includes the observer as well as the observed, so the so-called sensuous quality of the object seen at a distance emerges as the result of its relation to the organism that is sensitive to the object, and this character is as objective as is perspectivity, i e, belongs to the object, but to the object at a distance.

The difficulties involved in such a statement appear when we identify the object at a distance with the object of scientific theory. This object occupies the space of contact experience, i e., a Euclidean, homologous space, and its only content is a mass which is proportionate to the extent of space that is occupied, or to its inertia, or to some other form of energy such as electricity. By a crumbling analysis of manipulation we commence this analysis, reaching the smallest particles of immediate experience, and then we proceed by the indirect methods of scientific analysis. These involve the imagination which places the contact object at a distance and sets up a new imagined contact as the field in which the elements of the object are to be

found. But the ultimate content of the object is some form of energy occupying space, and an energy which offers resistance, or has inertia. It is a content of contact experience. Such a statement of the nature of the object abandons the so-called distance characters of the object, for when they are stated in these terms they have no longer the distance characters.

The distance character of the object either becomes a content of consciousness projected into the object or else becomes a character which is fortuitously there when the physical and physiological conditions are given. It is conditioned by the physical and physiological situation but not caused by them in the sense in which "causation" is used in the description of the physical and physiological situation.

There is a further discrepancy between these distance characters and those which physical science assumes in the object. In the perhaps uncritical scientific view of the world, that which is presented in our historical account of the earth, we present a congery of physical particles which, as occupying space and offering resistance and in motion, can appear in actual or imagined experience; and yet this world is conceived as independent of perceiving individuals. The distance characters are dependent upon the appearance of sensitive organisms; those of color upon the appearance of a very highly organized animal form. The physical and physiological conditions belong to the scientific account which is independent of these perceiving individuals. We only know that, when these conditions appear, these distance characters arise in the experiences of these organisms. The temptation to consider them as subjective is very strong, but if we yield to it we find that the contact characters must follow into the same category, for the conditions of the appearance of the distance characters as subjective would not be distinguishable from those which attend the appearance of the contact characters of things, and the physical object as such disappears in states of consciousness and the bare assumption of a thing-in-itself which cannot appear in experience at all. However, current scientific views of the world do assume physical

objects, which are stated in terms of mass and energy occupying space and possessing inertia (terms of contact experience), but which are conceived of as entirely independent of perceiving individuals, while these views find no place in their account of their objects for the distance factors in their qualitative content, and they recognize these characters as dependent upon their relation to the organisms that are sensitive to them.

I have called this current, and perhaps I should add, popular scientific view of the world, "uncritical." Its uncritical character is evident in its unwarranted discrimination between the so-called secondary and primary qualities of matter, in the way of their objectivity. If color and sound and the rest of these qualities are subjective, the effective occupation of space through resistance to contact is in the same boat. The secondary qualities cannot be proved to be subjective by substituting for them the motions and structure of congeries of physical particles, nor can their subjectivity be proved by their relativity to the sensitivity of the organism, unless the same relativity obtains for the so-called primary qualities. If color is for this reason to be called a state of consciousness, then resistance must be also a state of consciousness, for this experience also is conditioned by the normal functioning of the physiological organism.

It is, however, worth while pursuing this discrimination back to its grounds, which are not fairly presented in this division of experience into matter and consciousness. That we should consider that part of our experience of nature objective which appears as the effective occupation of space through resistance is a natural assumption, since the reality of what affects us from a distance is found in experience by coming into contact with it. We are but completing the conduct with reference to it, to which the object at a distance has given occasion. The experience in contact is what the object at a distance has promised. The felt object is, however, still colored, odorous, and sounding; but, if we pursue the crumbling analysis, which seems to carry us nearer to its material reality, by indirect scientific measures,

we reach points at which the elements of the material object can under our physical theories no longer possess these qualities. We reach objects so minute that they could not subtend a light vibration. There is no contradiction, however, in conceiving these particles, however minute, as still occupying space and exercising resistance. In imagination the extended resistant matter of our experience may be indefinitely subdivided without losing the character which it has in experience.

The import of these implicit judgments is obscured, however far we push our analyses, by the hypothetical models which we present to our scientific imaginations in the form of distance experience. We present to ourselves the ordered system of protons and electrons constituting an atom in the same fashion that we present a galaxy of stellar bodies. This, however, only disguises the fact that we conceive ourselves to have reached in these electrical particles the ultimate reality of matter in terms of resistant extended energy. While this energy exhibits itself in and is exactly defined by motions which relate themselves to perception in some form of distance experience, the "what the particle is" shows itself by the resistance which it offers from within its spatial boundaries.

Neo-Kantian as well as other critical thought makes out of the systematic exhibitions of energy and the definitions they furnish the objective nature of the physical object, but this does not reflect the current and perhaps more naive view of the world which I am trying to bring out and to free from the Cartesian interpretation into which it so naturally falls. It belongs to this view to recognize the distance character as belonging to the object at a distance and not to assume that these characters can be replaced by contact characters, however essential conditions for the appearance of the distance characters the ultimate masses and energies of physical thing may be. Furthermore, it is no offence to this naive view to recognize that the distance characters are dependent upon the situation in which the percipient individual is an essential element. We recognize readily enough that to the color-blind individual the

red object is yellow, and its yellowness belongs to the object. The fact that we can state this in terms of a defect in the retina does not relegate the color to consciousness for such a view. But what the object is for this view is what we can actually or imaginatively handle, and the justification for this lies in the completion of the act which the distance character initiates—nor does this in any sense annihilate the objectivity of the character at a distance.

This brings us to the situation within which the contact values of objects arise. That which appears in contact experience is matter. As pointed out above, all the distance qualities of things are referred to it, at least in the sense that they invite or avoid contact. The field of matter is also the field of congruence—the congruence of that which is seen at a distance with that which is felt when the act is completed, and the still more fundamental congruence in spatiotemporal extension of the thing with itself. The other congruences, such as the anticipated flavor with that on the palate, the sight and grasp of the hand of a friend with the sound of his voice, or the odor of a flower with the form and color of a rose, are in their agreements and discrepancies referred to the material result of the acts which these distance experiences initiate. It provides the reliable things with which we operate.

Is the material aspect of things as it appears in ultimate contact experience as subject to the influence of the perspective as are the distance aspects? We have already seen that, if we interpret perspectives as owing to the dependence of experience on physiological conditions, the material aspect of things will become as subjective as the distance aspects. But in this view this is not the case. The final content of spatially located resistant energy which the physical sciences recognize in the ultimate physical particle is that constant character into which the other characters may be translated, but which is itself uniform. Another way of expressing this is to say that, while the other characters may await the appearance of individuals with certain sensory equipment, matter effectively occupying space

is the presupposition of individuals and is regarded as independent of them and the situations which they in some sense determine.

There are two ways of maintaining this independence of matter and still placing the contact experience in the same position as that of the distance characters of things. One way is that of Mill, who defines matter as the permanent possibility of sensation, relegates it to a faith in a something that cannot come into experience and yet may be regarded as the condition of experience. The other way is that of the critical philosopher of science who defines matter in terms of permanent relations of what appears and in the laws of the motions. Neither of these answers to the attitude which I have presented as that of a somewhat naive physical science which but carries the attitude of common sense into the region of the imaginary structure of matter which scientific analysis and hypothesis suggest and make use of in their models.

It belongs to the matter of experience not only to embody that to which distance experience refers but also to embody that which, as effectively occupying space, is uniform in the experience of all who are involved in the experience. The distance experiences of different individuals belong to so many different perspectives. They can all be translated into a common contact experience, but in themselves they are in varying degrees discrepant. Because they are perceived in terms of the outcome of the acts they incite, they are perceived by different individuals as the same objects, but the contents of these objects at a distance vary with the different distances, the different sense apparatus involved, and the individual peculiarities of these sense apparatuses. The contact experiences can be in a common field whose spatiotemporal structure is identical. It is possible to define the spatial boundaries of things by congruence so as to attain identity of measure, and on the basis of the laws of motion to establish a correspondence between weight and mass, so that the individual perspectives of contact cancel out. Mat-

ter is experientially and experimentally identical to those who belong to the same consentient set.

It has remained for the theory of relativity to introduce perspectives even into this field of what may be called temporal perspectives. The perspective turns upon the difference in simultaneity. Within a consentient set all objects at rest are occupying events which are simultaneous at any moment. Such objects continue to occupy events which have the relation of "there" in reference to the "here" of the percipient event, which relationship determines the consentient set. The event-particles that are occupied by these objects are point-tracks, and in the permanent space of this consentient set they are points. Other objects, i.e., those which are in motion, in their passage occupy events which do not have the same continued value of "there" in reference to the "here" of the percipient event, i.e., the route of such an object cuts through the point-tracks of the consentient set, or, in the permanent space of that set, it passes through the points of that space. A permanent space is one in which the persistent relations of "here" and "there" from the standpoint of a percipient event convert point-tracks into points. Objects which occupy these points are at rest though they are passing, or at least the events they occupy are passing. The route of a physical particle, or other object, which occupies successively different points, or cuts different point-tracks, is the route of an object in motion.

The meaning of simultaneity is reached by the conception of the universe at an instant, i.e., the universe in which the temporal extension has been restricted so that from the standpoint of a percipient event the values of "here" and "there" of all objects approach the limit of not varying, i.e., of a universe in which there is no motion. If there were an absolute space-time, the world at an instant would be identical for all percipient events; there would be but one simultaneity, only one universe at an instant. There being no absolute space-time, it is conceivable that events which are simultaneous in one consentient set may not be simultaneous in another.

In the universe of any one consentient set which is common to a group of individuals, the spatial perspectives of different individuals, and of the same individual at different moments, are all translated into the congruent objects of the contact field. The man whom I am approaching from a distance does not remain congruent with himself as a visual experience, but the man of contact experience whom I see in these different visual experiences does remain congruent with himself from moment to moment, and it is this man into whose dimensions are translated the different perspectives of distance experience.

In two different consentient sets, such as those of a man on the earth and a man on the planet Mars, the distance perspective is not translated into an identical contact field.

The contact experience in each case, to which the distance experience is referred in the actual perception, can appear in the perception of the other only as a distance content. As a distance content it will be perceived in terms of the contact field of the percipient event. What is a point for one percipient event, or perceiving individual, which is localized in the analysis of the contact field, is a line for another perceiving individual, for whom the consentient set of the first individual is in motion.

If two fields are moving with reference to each other, and an object is seen in one of them, both by an observer in the field in which the object is at rest and by an observer in the other field for whom the object is moving, then the object will be seen by both as an object of contact experience. This means that the object occupies certain portions of space-time which we call "events," which are determined by their relation of "there" to the "here" of the percipient events. This exact location is therefore always with reference to a set of objects which are at rest, that is, occupy point-tracks. In the case of the moving body it is necessary to take the world at an instant to exactly locate the object, a world in which there is no motion. To recapture motion as a fact of experience, we fuse together the series of moments in a permanent space, which is the space of the percipient event's "here," i.e., his contact experience extended into

the "there" that corresponds to this "here." As the string of event-particles in point-tracks are fused into points, which are occupied by the objects, the permanence of the objects overshadows the passage of the object through the series of events which are fused in the point of permanent space. It is the same object whatever event in the point-track or point it occupies. It is possible, therefore, for the same object for the two observers, say, on the earth and on Mars, to be occupying different events, when each observer from his own consentient set observes the moving object and its consentient set. At a certain moment, i.e., the world at an instant for the man on the earth, he locates all the "theres" of his field and includes in this Mars and the observer on Mars. The "theres" are events occupied by objects, at this instant, which are succeeded by events occupied by the same objects. If the objects are in motion, as are Mars and its observer, from the standpoint of the earth observer they will not occupy point-tracks in the consentient set of the earth observer, but their spatial routes will cut across the point-tracks of his set, or his permanent space. If we shift the standpoint, Mars and its observer will be at rest, i.e., its objects occupying point-tracks, while the earth and its observer will be describing spatial routes in the Martian's consentient set.

C. ONTOLOGICAL ASSUMPTIONS AS EMPIRICAL REGULATIVE PROCEDURES

The whole tendency of the natural sciences, as exhibited especially in physics and chemistry, is to replace the objects of immediate experience by hypothetical objects which lie beyond the range of possible experience. As I have pointed out above, an experimental science must bring any theory to the test of an experience which is immediate, which lies within the "now." It is, in my opinion, a legitimate doctrine which I will not now develop that it must be possible to regard the hypothetical sub-experiential objects as the statements of the methods and formulas for the control of objects in the world of actual experience, in other words, that so-called objects which lie beyond

the range of possible experience are in reality complex procedures in the control of actual experience.

In the immediate "now" it is impossible to draw the customary line between conscious experience and physical objects. What the epistemologist calls the meanings of things, the universals, the concepts, what is ascribed to the sensuous experience of the individual, is found in the objects themselves. Even the pleasurable and painful experiences are experiences of pleasurable and painful objects which cannot be made private experiences except by the ascription of parts of the biological organism, such as the pleased palate and the aching tooth, to a self, or soul, or mind, while the mind or self is found in immediate experience to involve other social individuals as preconditions for its existence. The physical object is found to be that object to which there is no social response which calls out again a social response in the individual. The objects with which we cannot carry on social intercourse are the physical objects of the world.

Consciousness implies, then, nothing but the presence of other social objects in experience, that is, social objects with whom we enter into experience, and whose existence is involved in our own existence as selves. Thought, on the other hand, is a social intercourse with the self in which reference arises to things not in the immediate "now." This reference to social or physical objects is termed also "consciousness" of the objects and involves the analysis and apprehension which has been earlier discussed, but this does not involve the distinction between a conscious being and one without consciousness. That distinction appears when one says of one who has died, "There is no speculation in those eyes." An individual of the group that is essential to our self-consciousness has ceased to exist as a social being. The apparatus of the social intercourse is in a measure there, but it fails to function.

Imagine, now, the nerves and muscles of the face, the arms and whole body, and even those of the organs of articulation, brought into action by cunning mechanical devices, and we are

back again with the Cartesian hypothesis of mechanical unconscious animals. And this raises again the question of the relation of the nervous system and consciousness. It is not the individual speaking, moving in the midst of his conduct, that suggests this distinction between the body and consciousness. Especially in the midst of an emotional experience, with its expressive play of the features and the attitudes of the body, is the distinction between the consciousness and the biological organism out of the question. It is, of course, true that the actor mimics nature and presents the form of emotion without the substance; the expression can be there without that which it is supposed to express. The field of error is as wide and long here as it is anywhere in human experience, but that does not carry with it the existence of a content that is, because it is subject to error, also separable from the objects in the experience which are not in error. Admitting for the sake of argument that the Cartesian hypothesis could be extended to man, and that one man found himself among a group of others all of whose gestures and attitudes were mechanically produced but so perfectly that he was deceived into accepting them as men, and we would have a case of illusion carried to the extreme limit, but no proof of a consciousness separable from a biological organism. Consciousness as the experience of social objects has as an integral part of itself contents which the parallelist considers constituents of the biological organism, as purely physical in their nature. An individual without a tone of voice, without an expression of countenance, in a word, without a gesture, even a vocal gesture, would be a nothing, less than a *vox et praeterea nihil*.

The distinction in immediate experience is between a social being and a being that is not a social being, and this is a distinction which cuts across that created by the physical sciences in isolating and defining their field of objects. It is true that every purely physical object, in the sense of the physical sciences, is a nonsocial object, but the proposition is not convertible. Every nonsocial object is not a physical object.

The line of division that, first of all, ran through the nonsocial objects, with the waning of sympathetic magic and the development of the reflective technique, was the metaphysical line, that which I have already remarked upon, drawn authoritatively by Aristotle. The distinction was between a form or nature and matter. The nature of the object tended to develop to its full perfection, and the matter was conceived of as the possibility of the form or nature, though it was also recognized as offering a certain resistance to this development. The aim of the reflective process was that of identification of the nature of the object, that which it really was, and its subsumptive relationship to genera above and below it. Without discussing the content of the nature of the object, to characters of which I have already referred, I wish here to point out that this metaphysical line of division left a matter and a physical object which are defined in terms of the absence of, and resistance to, the full development of the form or nature of the object. Full realization of the nature of the object, full reality in other words, involved the disappearance of the physical object in so far as this arose out of this metaphysical distinction.

It should be noted, of course, that the doctrine of Democritus called for a metaphysical physical object, defined in terms of its nature of weight, size, and physical form, and introduced the conception of the secondary nature of the other sensuous characters of objects. As stated, this definition of the Democritean atom is metaphysical. It is not a hypothetical conception based upon actual mathematical relations of the multiple proportions in which substances combine, nor upon the measurement of motions which take place within the seemingly static substances, or those which serve to explain electrical phenomena, though it presupposes an atomic structure of matter which would account for the presence in experience of other characters of matter beside those of geometrical form, weight, and direction and velocity of motion. In this sense a conception was offered which later became valuable as a hypothetical object when observations were made in the study of actual physical

and chemical problems which could be offered as bases for the determination of the atom and the molecule in terms of definite measurable experiences.

The speculative thought of the ancient world found in the Democritean atom only a subject for metaphysical discussion of the nature of matter, its divisibility, and the nature of sensuous experience. It is worth while noting that no group of thinkers in the ancient world, apart from the Epicureans, found in the atomic doctrine a welcome conception and that its import for them was found in its effectiveness in fighting the superstitions of popular religion and custom. The atomic doctrine swept away the meaning of the world as it had existed in the minds of the ancients and with it all the remains of sympathetic magic which obscured men's minds and degraded their intelligent reaction to the world about them. Democritean atomism was a spiritual cathartic, not a working hypothesis. It also presented a metaphysical instead of a logical basis for the distinction between the so-called primary and secondary sense qualities. The primary experience was assumed to be of the real nature of matter, its weight, form, and motion; while the other sensuous characters were assumed to be subjective private experiences of the individual. This introduces two metaphysical contents: that of extended heavy moving matter and that of a soul affected by changes of the first order. This second substance, that of the soul, Democritus did not introduce, but his doctrine opened the way for its appearance. Out of it comes the dualism of Cartesianism and of Locke and his followers, but the later analysis inevitably deprived both of these substances of direct experience: body and mind both became metaphysical substances, and objects in experience became phenomenal.

There is an obvious distinction between the character of objects as extended and occupying space, as possessed of inertia and movability, and that of objects as colored, sounding, sapid, odorous, warm or cold, heavy or light, painful or pleasant—not to mention a host of other characters that spring from combinations of these. The distinction lies in the facts that our con-

duct is always with reference to objects at a distance, while the goal of this conduct is found in ultimate contacts or the avoidance of such contacts, and that into the perception of these objects there enters imagery of past contacts which represents the end which the act seeks. In other words, we are always stating distance experiences in terms of anticipated contact experiences. Ultimate contact experience, as I have indicated above, is that of manipulation, and connotes extension, the occupation of space, and motion. Intelligence in conduct in the perceptual world shows itself in the continual translation of distance experience into that of contact. The corpuscular theory of nature has its ground in the fact that the hand naturally breaks things up into parts which can be rolled between the thumb and finger. Whatever can be seen, heard, smelled, or tasted must logically be tactually experienced to be realized, to reach the ultimate form that our perceptual attitudes anticipate.

It is to be further noted that the experience of the object at a distance is of an object which continually changes its size, while contact experience is of an invariable; and the invariable contact experience is continually entering into the varying distance experiences in the form of imagery, giving us our bases of estimation. It is in this relationship between the distance and contact experiences of the same object that lies the rationale of the telescope and the microscope. It is important to distinguish between the ultimate corpuscular experience and the changes which are induced by the projection of it—the ultimate corpuscular experience—to a distance. The statement of the infinite divisibility of extension always implies the translation of the ultimate contact element into terms of distance experience—that of vision—and giving to it, therefore, variable dimensions which depend solely on the distance at which the imagination places the object of tactual experience. Thus there are certain characters of the object which appear in experience as ultimate, while others shift and vary as the relative positions of the object and the individual change. Tactual extension, occupation of space, and motion are primary and fundamental, all the other qualities of objects have functional references to contact ex-

periences which they imply. A Democritean world, therefore, made up of atoms which are conceived in terms of tactual experience, is a world of ultimates.

The question arises, What is the import of this relationship of primary and secondary qualities? What is so far given is this: The carrying-out of implications of the act leads to contact experiences which answer to the other characters of the object sensed at a distance, there being a type of ultimate experience in which all the other qualities of the object are lost. To affirm color, sound, odor, taste, or temperature of an object is to invite conduct which will lead to contact experiences which will not be of the sort which called out the act. There is a further point to be noted. The body which is spatially seen, with its extent and content and distance, is translated into tactual spatial experience in a one to one relation. We can identify point for point what the eye sees with that which the hand feels. What we see is made up of things that we do or conceivably can feel. Between the two we have, metaphysically speaking, a phenomenal and noumenal relationship. The doctrine of the subjective nature of the secondary sensuous qualities is the carrying still further of this metaphysical interpretation. The qualities must be put somewhere. They cannot be placed in the tactual object, as can be the extension of vision. The fact that tactual characters are found to be conditions of the experience of the secondary qualities—as evidenced in the physical theories of light, sound, heat, etc.—lends a superficial justification to the undertaking, for these theories detail the specific physical stimuli which are responsible for the seeming effects on the soul. These qualities, then, are located as separable entities in an inner world.

As I have indicated, the line of distinction here is metaphysical but should be logical, that is, the reason for the distinction between the two types of sensuous qualities is to be found in the relation of contents to each other, a relation which arises out of the form and structure of the act. We find, then, over against the social object two nonsocial objects; those of immediate experience, colored, sounding, sapid, odorous, warm

and hot, pleasant or unpleasant, beautiful or ugly, replete with meaning, but without social response; and the objects of the physical sciences, having only contact values, occupying space to the exclusion of other objects, possessed of inertia, and capable of motion and rest, but without other so-called sensuous characters. That these physical objects are without these characters is logically necessary, for it is through the changes which they undergo that modern science has undertaken to explain these characters. The physical theories of light, heat, sound, electricity, of taste and odor, presuppose a world of physical things which have none of these characters, except in so far as they arise in individuals through the operation of physical and chemical causes upon the biological organism, and a biological organism which can conceivably be stated in the same terms. It is important to recognize that this physical object and the sense data of an epistemological psychology go together. Each implies the other. It is also important to recognize that both imply the world of immediate experience and that they are logical abstractions from this world, not metaphysical entities. The evidence for this position is found in the fact already adduced, that the test of any scientific doctrine is found in an experiment which must take place in the field of immediate experience. This field is that of reality in scientific technique. Neither the abstractions of a science which has undertaken to explain secondary sense qualities in terms of primary sense qualities nor those of an epistemological psychology can be actually brought within the scene of the experimental showdown. The further evidence of this can be secured by following the reasoning of those who undertake to build up a world either on the basis of the abstractions of the physical, mathematical, and recent logical sciences or on those of an intellectualistic psychology.

These theorists in their explanation of the secondary sense qualities in terms of the primary must admit that the illusory character ascribed to the experience of the secondary qualities attaches itself to the primary qualities as well, unless there is present some ground for accepting these which does not hold for experience of the primary qualities—the problem Hume pre-

sented in summary fashion. The difference between the position of Hume and that of the modern philosophically minded scientist is found in the shift of interest. With Hume the problem was the old epistemological one—how can one get from an experience that is but a state of mind to an object outside the mind to which it refers? With modern science the problem has become that of getting a hypothesis that will work within the field of immediate experience, thus attaining the security which attaches to unquestioned immediate experience. For modern science the uncertainty of knowledge extends only as far as the boundaries of the particular problem with which science is occupied. Furthermore, the security it seeks is not sought in a theory of knowledge but in the success of the hypothesis in predicting events in the field of unquestioned immediate experience. It goes without saying that, however abstract the definition of the subexperiential objects may be, they can be presented as real in the imagination only as having both distance and contact contents, and these values are inevitably those of our own experience. In the abstraction which is made from the characters of objects of immediate experience (except those of contact) the organism and the objects that affect it are stated so far as possible in terms of contact experience. The undertaking is to state in contact terms the other characters, or, in other words, what contact conditions are essential for bringing about these experiences. That is, physical science is reversing the attitude involved in perception, which endows the distance experiences with contact values in the sense of giving solidity and contact extension to what is seen and heard, while science substitutes for these distance contents contact contents.

The test of the experimental method is found in making the hypothesis such an essential part of the field of experience that on the basis of the hypothesis later events can be predicted. The later event is of the nature of the contact experience anticipated in a distance experience, in our perceptions. Such contact experiences are experimental proofs of the validity of what sight, or sound, or odor initiated. Such experimental proof, however, does not substitute the contact experience for the dis-

tance experience. Color and sound and odor remain color and sound and odor. They have been given the assured body which the stimulation promised. The undertaking of the physical science which sets up a physical object as ultimate—a physical object that has only contact values—is to replace the distance contents with contact contents, to replace color with surfaces reflecting certain vibrations while they absorb others, to replace sound by vibrations of air, odor by chemical changes, etc. It is evident that in terms of perception an ultimate in this sense cannot be found, for perception is a compound of distance and contact experiences. The ultimate particle, whatever it might be, must be conceived in that which invites action and tests it by contact experience—but that which invites action from a possible distance is a secondary quality in the terminology of the textbooks. Admit that the ultimate object is too minute to subtend a ray of light, that *a fortiori* it can have none of the secondary qualities and yet that its existence is demonstrated by the deductions from experimental science, and still that object if it is to be a possible object in a perceptual field implies some other secondary quality, at least one by which it calls out the action which contact experience fulfils. It is this requirement which physical science undertakes to meet by stating distance contents in terms of contact contents. The body has no color but it has a surface which reflects and absorbs light rays. It has no sound but its particles vibrate. Now while these accounts of the structure of the objects as far as they go are correct, this account of the secondary quality—that quality which acts at a distance—does not serve to present an object as an ultimate reality without secondary qualities, i.e., without characters which reveal the object at a distance and arouse the response that brings with it the test of ultimate reality. We are still assuming something in this ultimate object which is more than the occupation of a contact space, of mobility, and inertia. This other something is what would be involved in its being a part of a field of immediate experience—part of the structure of the field of experience.

XVII

MECHANICAL AND TELEOLOGICAL OBJECTS

A MECHANICAL object is one that is defined in terms of other things. A teleological object is one that defines other things in terms of itself. An electron is defined in terms of the fields of all other electrons as they are registered in its field. A living form defines food, enemies, refuges, and the like in terms of itself. In the case of the mechanical object we conceive of a process that is there in independence of the object, and within which the object appears as a determination of the mechanical whole. In the case of the teleological object we conceive of a process which constitutes the nature of the object, such as the plant or animal and of the surrounding things as continuations of this process—as food or resting places or respiratory air.

It follows that the objects of the environment of the teleological object enter into the perspective of the object only as embodying the process of the living form. Its own process of eating determines the food as offering itself for eating. It is only in so far as it offers itself for eating that it excites the form to seek it, i.e., in so far as it is a terminus of the eating process. The termination is present in the preparations of the final reactions which control the earlier parts of the act. There is here more than the selection of the characters which excite these terminal reactions. Their organization over against those which lead to the earlier phases of the act takes place in a pattern of the completed act that is going on in the living form. It is, then, the actual presence in the form of the beginnings of later processes controlling the earlier processes that is responsible for the pattern of the final object, and it is the control of the earlier processes that appears in the experience of the living form as the object—if it does appear. Control involves the presence of the

object as determining the response; this can be there in advance only in so far as the whole process goes on within the organism. In the food process the whole process of taking up the hydrocarbons and proteins and assimilating them is going on within the system, and it is in the carrying-on of this act that the reaching and ingesting of the food without the body takes place. The cells of the organism take the nourishment from the inner fluid medium of the body. The body is continually eating in the process of getting the outer food. It is, therefore, taking the attitude of the distant food in the process of seeking and ingesting the food. That which is wanted is present in the satisfaction of the want. The form actually uses that which is sought in obtaining the wanted object. It aerates the system in respiration. It eats in getting food. It expends the required mineral products in replacing them. It reproduces through subdivision of generative cells in seeking the answering sex in reproduction. The process of want or need always arises through the expenditure of that which is wanted. The process going on inside the organism is extended outside through the further elaboration of the process, and it is that which is sought which is present in the inner organic operation which controls the attainment of the outer object—thus sexual stimulation is the inner reproduction of ova and spermatozoa. The control lies in the excitement of the inner process. This directs the approach to and conjugation of the sexes. The need within the system such as hunger arises through the expenditure of the food which is being exhausted. This expenditure excites the organs of taste and odor and of digestion. The watering of the mouth and the flow of digestive fluids are ready to operate upon what is there in insufficient amount.

The biological processes go on within the organism. The activities of the organism, within its environment, keep these processes in continuous operation. The mechanism for this consists in movements of the organism or its members that imply a sensitivity owing to deficiencies in the inner situation of the organism that lead to stimulations through outer objects setting

free responses that replace the deficiencies. These reactions to external stimulations may, however, be looked at from the standpoint of inner processes. In this view it is the deficiency that leads to the inner process taking on a different character. The process, however, continues to be of the same character. The cells take nourishment from the inner medium and give off into this medium their waste products and peculiar secretions. They take in oxygen and give off carbon dioxide. Some cells reproduce by fision, others are checked in this tendency by the character of their differentiation in its reaction to substances in the inner medium. The differentiation of the cells expresses the organic value of these deficiencies. Thus lack of nourishment in the inner medium answers to the specialization of cells of locomotion and ingestion. The differentiated cells are in the inner mechanism the representations of the outer objects which supply the inner deficiencies. Differentiation is the development of one function of the living process at the expense of the others. Food process, ingestion, and assimilation in the unicellular form is that which leads up to expenditure of energy. Muscle and nerve cells specialize in the expenditure of energy and only ingest and assimilate what is essential to their own activity. Cells in the digestive tract ingest and assimilate for the whole organism and only expend energy which is essential to their own activity. The lack of ingestion and assimilation on the part of these cells expresses itself in the heightened activity of nerve and muscle cells. For differentiation of one function takes place at the expense of others, only so much being retained as is essential for the continued existence of the cell itself. This differentiation is, then, an expression of absence of the function in so far as this is essential to the organism as a whole. The sensitivity of sense organs, the motility of muscle cells, and the operation of nerve tracts thus answer to the absence of the ingestion and assimilation of food. These cells are from the standpoint of the food process of the organism a liability to the organism; they are the needs or wants of the system. They have to be supported by the system, and their exercise of their functions consti-

tutes thus a need of the system. Furthermore, these functions are all parts of the original process within the unicellular form. Motion involving expenditure of energy means overcoming distance lying between the organism and food, and nutritivity means the adjustment of the organism to the food in the process of ingestion. The extension of the life-process to take in the environment implies that the interrelation of the functions in the unicellular form leaves them in the same relation; the outer object is but the reflex of the satisfaction of the function which the exercise of the other functions makes possible. The control lies, then, in the function which is in want. The exercise of this in the feeding of the cells which are differentiated for the exercise of other functions, when the food cells differentiated for the food process are without material for their function, is the result of the accomplishment of the task of the nutritive cells. The latter have given the motile cells the means of the exercise of their function. For these cells to take nourishment is to expend energy. It is their food process which controls their providing the food for the nutritive cells. In the organism the lack of means of expression of one function is a stimulation of the others.

The motile and other differentiated cells in their taking of food for the exercise of their functions are acting as the outer objects will act upon the organism; they are exciting the nutritive cells to activity by their demands upon them, while the ingested food will excite these cells by the presence of the nourishment. It is this excitement of the nutritive tract by the non-nutritive cells that gives rise to the stimulus to the nonnutritive cells which continues until the food provides the stimulus to the proper exercise of the nutritive tract.

The function and activity of nonnutritive cells in depleting the stores produced by the nutritive cells constitute a need or want in the system; their action, then, stimulates the nutritive cells, but though they stimulate the nutritive tract by exhausting the cell food in the system, they have at their disposal the energy of the system which is not called upon by process of di-

gestion and assimilation, and in the mechanism of the system the readiness of nutritive process stimulates the nonnutritive tracts. The action of the latter in their exhaustion of food in the system takes the place of the food which is brought into the system in exciting the nutritive tract. In expending energy the nonnutritive tracts assume the role of the food they are seeking.

In general, the outer object is already in the system as a want. It is patterned by the differentiated cells which are not occupied with it in the economy of the system. These cell tissues, however, must depend upon those which are occupied with that which is wanted. The use of the reserve store of that which is wanted stimulates the cells which are occupied with it, and these stimulate those that depend upon cells whose activity brings contact with external sources. In distance stimulation the organism is already acting upon itself as the outer object will act upon it, i.e., the distance stimulation arouses the responses of the organism to the object before the object is reached. The adjustment of the organism to contact through distance stimulation in advance of contact is a taking of the role of the distant object by the organism itself.

Want is not mere absence of that which is needed. In pathological conditions there is absence of nourishment but no want of appetite. Want is the stimulation of the process which lacks some material by those processes which supply the want while they exhaust the store of material in their process. This is the content of the want. It functions as the actual food functions later, i.e., it stimulates the processes of digestion. It is taking the role in this way of the outer object. The form of the outer object appears in the relation of the distance stimulation to contact processes. The distance stimulation arouses not only the processes of approach or withdrawal but also those of prehension in advance of actual contact.

From the standpoint of want the content of the object is the organic response that is seeking expression in advance of the object which supplies the want, and the form of the wanted ob-

ject is the organized reaction of the differentiated tissues which are not themselves involved in the want but which arouse it through their own exhaustion of what is needed and at the same time lead up to the satisfaction of the want. The physical object is one that comes between the initiation of the want and its satisfaction. It is not itself as a physical object the satisfaction or consummation of the act. It represents the contact relation of the organism to that which is extraorganic. The satisfaction takes place within the organism. The physical object lies outside the organism. The distinction between the organism and its environment is confused by the fact that the organism is stated in terms of the physical objects which constitute the environment. The definition of the organism is in terms of differentiation of cells which have always constituted a unity. It has arisen through cell division, and differentiation has maintained a unity. The simplest account identifies the organism with the living cells which have arisen through cell division and later growth. The unity, however, cannot be maintained except through relations with that which is not such an organization of cells.

The life-process of the single cells requires hydrocarbons, proteins, and various other chemicals for its existence, and possibility of excretion of waste products. The multicellular organism incloses within its own cellular structure an environment which serves these purposes for the different cells. The earliest distinction between the single cell and its nonorganic environment is gradual. The digestion begins outside the cell. The flowing of the organism about its surroundings makes the lines of demarcation broad and uncertain. The gases and fluids pass within and without and allow of no definite separation between the organism and its surroundings. There is the same situation in the relation of the cells to the inner environment. It is impossible to draw any definite line between the inner fluid environment and the living cells which it bathes. The multicellular organism exposes surfaces which are not living to surrounding objects and thus sets up relations of externality.

Externality means that the relation between the organism and its environment can no longer be that of the living process that flows between organism and surrounding nature. It must take place by distance stimulation, and defines distance stimulation as a relation springing out of living processes, e.g., radiation specialized in light out of warmth, sound waves out of adjustment to a fluid environment, smell out of the process of digestive ingestion; answering to this analysis of stimulation is that of motion of the cells which is not that of the life-process as a whole but of the organism as a whole or its parts.

XVIII

FORM AND ENVIRONMENT

A PHYSICAL thing lies in a space-time, and it has characters. Both the space-time and the characters are conditioned by the organism within whose field of experience the physical thing lies. This statement, however, carries with it a complication, owing to the fact that the organism is itself a physical thing, and commonly exists in the field of the very organism with reference to which the other physical things are regarded as conditioned. Under the naïve assumption that the organism is independent of the determining influence which the organism exercises upon its field, the organism is that of an observer who is regarding the organism. He is, then, bringing the organism within his own field. When he regards his own organism as determining his field, he is then taking the attitude of this other. In so far as it is the generalized attitude of the scientists, he assumes this as that which is the control in his own estimate of the influence which his organism exercises over his own field.

This generalized attitude of the scientists, then, presents a "reality" which implies a passage from one's own field to the field of another. This is accomplished by addressing the other and taking his attitude in reply to one's own gesture. This is the psychological process that answers to the relativist's recognition that what for him is moving may be at rest from the standpoint of another consentient set, while his consentient set is regarded as executing the motion. The relativist's transformation formula appears when the psychological process fails. Psychologically, one places one's self in the co-ordinates of the sun or that of the fixed stars. This becomes impossible when differences in simultaneity are postulated, i.e., we can place ourselves in the spatial perspective of another but not in a temporal per-

spective of another. The former leads up to the world at an instant and to the presentation of a stuff with a content of inertia as an expression of the quantity of matter. The latter comes back to the definition of things in terms of transformation formulas, and these cannot be brought into the perceptual field. Matter is stated in terms of energy, i.e., in terms of the amount of work that can be done. In the formula one can change it, but not in experience.

Given an absolute space and an absolute time which are presuppositions of physical objects, of the biological objects, and of psychological processes, and it is conceivable that any object presented from any standpoint would have the same implications. It would be a matter of no importance that the organism could be brought into one's picture of one's world only through one's taking the attitude of another, provided that attitude allowed one to present the organism in the same spatial relations as those of the objects about the organism; but if space is relational and presupposes things with extensive characters, and if these relations must find in the organism a point of reference for their emergence as a consentient set, and if these extensive characters of things are conditioned by the organism in the same sense that the other so-called sensuous characters of things are so conditioned and are the source of the relational space, then the inclusion of the organism in the environment of the organism—an environment for whose spatial character the organism is a condition—by observing one's self in the attitude of another, involves the same paralogism that would be involved in including the retina as colored in the colored environment, when one assumes that the structure of the retina is the condition for the color of the environment. On the contrary, we conceive of the retina as containing chemical elements which in their disintegration are the condition for the appearance of color in the environment. We may call these "pigments" and identify them by their color, but the form in which we can state them in their function of determining the character of the environment must be other than that of which they are the condition. In the same

fashion, if we make the organism the condition for the extensive character of things and the consequent spatial relations, we cannot ascribe to the organism as such a condition the extensive character of the thing. What we do actually is to place the organism not in the perspective of the individual but in a generalized landscape in which the magnitudes and forms of objects are not distorted by the perspective of vision, the dominant distance sense. This generalized attitude of the other is an assumption of a space that is absolute over against the relativity of individual organisms. It does not provide us with a statement of the organism in terms out of which the perspective of a consentient set arises with its spatial characters. So far as this is accomplished, it is in terms of the coincidence of events and the intervals between them, generalized from transformation formulas. But these lie entirely outside experience.

In more detail: When the individual assumes the attitude of pushing a heavy object, its character as ponderous is more than stimulation to exercise effort. It is a sense of the pressure or inertia which the body will exert upon the individual. It is true that memory images of past expenditures of effort upon it or like objects may arise, but these images will be of the efforts expended aroused by the stimulation of what we call the resistance of the object. They do not of themselves carry with them the location of the resistance in the object, nor is this location of the resistance given in the definition of the boundaries of the objects through sight and touch. What has taken place is the "feeling one's self into" the object. What are conditions of this attitude? There must be that in the position—I will say the gesture—of the object which arouses in the individual a resistance of the same sort as that which the body will exercise. I take it that it is the ability of the limbs to act upon the organism which endows the organism with this capacity to feel itself into the physical thing. When one sees the object to be pushed, it is first of all a stimulation to the pushing. Then the awakened tendency to push against the object calls out in the organism the tendency to resist one's own effort, as in the pressure of one hand

upon the other. One, then, identifies the mere stimulation to exercise more effort with the expenditure of force on the part of the object because this playing of the role of the heavy object has excited one's response in advance of the actual contact with the object. There is a dramatic rehearsal of what one is advancing to do. There is doubtless behind this a social attitude, which is explicit at times, especially in childhood and moments of irritation. And this social attitude is of profound importance in the origin of this physical thing.

I am distinguishing here between the adaptation of the organism to the thing, though the thing as a thing does not enter into the experience of the individual (this may take place in automatic adjustments to an object in unexpected and rapid experience, when it is not until after the response to the object takes place that we recognize the object to which we have responded), and the realization of the interaction between an object and the organism, in which both are things. In the physical experience which has been subjected to the analysis and abstraction of a scientific age, the inside of such an object is mainly its inertia, its resistance to effort expended upon it. To a primitive man any object is capable of many other responses, which a sophisticated age regards as magical in their import, though our own irritations against and likings for physical things indicate that the physical things of our experience are abstractions from objects which have arisen in a social experience.

In the first of these two senses we may place the customary relation between form and environment where the form or organism by its selective response determines the environment, and where the environment reacts upon the form with its favorable or hostile influences. It is presumably the situation of plant and animal life below man. Difficult as it may be to conceive, it must have been an experience without selves and others and, hence, things without inherent characters, insides, natures. It was a world of exteriors, though without the experienced value of exteriors. Something like color or odor, taste, sound, hardness, softness or warmth or coldness was there, and the re-

sponses to these characters were there in the organism, but the mechanism for experiencing the response of the other thing within the organism and the calling-out of the organism's response to this attitude (this creation of an inside both in the self and in the other) waited upon the development of communication.

The account of the second sense in which the relation of the organism and the environment may be conceived may be called also the natural history of meaning. The earlier situation out of which it arises is the relation of form and environment with which evolutionary doctrines have dealt. I have called it a relation of exteriors, with the proviso that the term "exterior" must not carry with it the implication of interiors. It is only from the standpoint of the second stage that the field of this relationship can be called that of exteriors with the implication of interiors. In the terminology which I have just used it is a field of development which precedes the appearance of meanings. Unfortunately the account of it and of the rise of the field of meanings out of it can only be given in terms which have meanings. However, as I have just indicated, we can find protopathic experiences into which we promptly read meanings that were unquestionably there before these meanings belonged to either the objects or the organisms. The relationship is mutual. The environment is only there in so far as the organism is sensitive to it. In this sense the organism selects its environment. And in so far as the environment does answer to the sensitivity of the form, the environment acts upon the form. The expression of this relationship is found in the term "adaptation." It is this relationship which I have referred to as that between exteriors—exteriors without the implication of interiors.

XIX

MECHANISM AND CONTINGENCY¹

I SHOULD like to consider the relation of the contingent and the necessary, particularly in their relationship to sense qualities. Of course, the use of the term "sense quality" involves something of the abstraction which attaches to the sensation, in its assumption that we can take the sense quality out of its position. In one sense it is possible to do that in so far as we recognize that the sort of sensations that we have—the sensuous qualities that things have—might perfectly well have been different so far as the mechanical order of nature is concerned. That is, we are setting up a mechanical order of nature as the point of departure. We are holding that to be something independent of this sensuous experience. We are taking the history of the universe in terms of a mechanical order, and, if we do take the universe so, then the cropping-out of life and consciousness is quite arbitrary. That is, the actual character of life in itself, from the point of view of the mechanical statement of nature, is arbitrary, for the mechanical statement comes back just to the redistribution of physical particles as we find them in the universe; and the drawing of the lines around the physical objects, the movements, and changes, are nothing but arbitrary distinctions of these bodies from the world.

On the mechanical view of nature there are but two sets of objects: one of them is the universe as a whole and the other is the physical particles with their fields of force. Groups of the latter class that we isolate are, from the standpoint of this theory of nature, arbitrary in their isolation. Separate physical objects are abstractions, and they arise out of the particular interest which the scientist takes. Now, if we put over against that the interpretation of relativity which Whitehead has presented,

¹ Taken from student notes

we get another kind of approach. For him not only is any organism a reality in itself but the world is a different world in relationship to that organism; and his theory of the time systems, which would allow for an indefinite number of different organizations of the same events in their relationship to the different organisms, gives an indefinite number of different universes from the point of view of our experience. It presents the possibility of regarding the world as determined by the organism instead of regarding the organism as entirely determined by the world. His phrase is "the world is patient of the organism." Any structure is an organism that has an epoch; that is, it has a period of time during which it must endure in order to be what it is. An iron atom would need only a fraction of a second in order to be an iron atom, but every structure as such must have such a period in order to be what it is. It endures in so far as the universe is patient of it. That patience represents the adjustment of the universe to that organism. But if there is one aspect of the universe that is real, the others are phenomenal aspects, are subjective affairs. That is the difference between the statement which Whitehead has worked out and the Einsteinian. In the Einsteinian statement these different aspects are subjective affairs depending on the frame of reference. The absolute that exists outside is made up of ultimate events with intervals. That is another world, a noumenal world of the Kantian type.

In contrast with this the statement of Whitehead says that the world is made up of a number of events, but these events may succeed one another in any number of different orders. If you are traveling on a railroad train, the events are the rapid succession of telegraph poles. If you stand outside, the events are the rapid succession of car windows. If there is an absolute motion, it is made up of the same events; in one case the car windows are stationary, and the telegraph poles are flying. But you have different successions. From the point of view of any one organism you have such a succession of events that is patient of that particular organism. That perspective of the world is its relationship to that particular organism, and the universe as a

whole would be the organization of those perspectives with reference to one another. According to the Einsteinian doctrine, those perspectives lie within the experience of different individuals. The universe is made up of events which do not get into experience except in these relative points of view. Whitehead says that the world is made up of such perspectives. His view is Hegelian with this fundamental difference: in the Hegelian absolute the individual disappears as real, while from the standpoint of Whitehead every organism is real and has an aspect of the world which is, so to speak, private property, and that aspect of private property is not an "appearance" of the world. It has, however, a certain structure that is running through the world, and the universe as a whole answers to that particular organism; and these various structures are all possible.

By taking time seriously, as Bergson advises, and bringing it into the universe, we get another set of possibilities. We can have one event in one system succeeded by event A and, in another, simultaneous with A; so, while our universe has the same events, we have all these different systems. This view involves contingency as against the view of a fixed mechanical order of nature which has no place for the particular objects or, in Whitehead's terms, organisms as such. Their reality cannot be stated in terms of the universe as a whole. The universe as a whole is just a distribution of physical particles, and we cannot state the organism in terms of the universe as a whole. It is from the standpoint of such an abstract view of the world as made up of a number of things, and their fields of force, that life and values are contingent, though to write the history of the world in terms of the distribution of physical particles would be the ideal of physical science. In such a necessity there is no need for time; we would have to label the electrons and introduce our time variable, whereupon we might get another distribution, etc. There would be no animals, no day, "nor the sweet approach of eve or morn"; for contingency does not get into this particular order of things that is mechanically necessary and fixed, and the contingent thing is something that happens over and above

it. The values of the world, commencing with its disagreeable phases, are there in the world. They are not contingent in the experience in which we are occupied. The question is of the relationship of those various experiences to one another in the universe as we take it as a whole.

But it is true, coming back to the analysis of necessity as presented in science, that we can get certain natural laws which are necessary; that is, a statement of the changes of mass particles or energy particles or whatever they are that in their very passing carry with them what Whitehead calls a causative future. The routes have certain inherent characters that persist. If they persist in their passage, then we have certain necessary relations; that is, necessary relations do remain in whatever time system we select. They represent certain types of succession. There is that sort of a structure of the world from the point of view of these true Aristotelian characters which is necessary, and over against these there are characters which are responsible for organisms; and their aspects of the world are contingent. There is no meaning to contingency if we start off with the sort of necessity that does obtain in the physical theory. Against such a view, take the situation as Aristotle presented it. The efficient cause is the least important of his causes, and it belonged to a field of reality in which the accident, in the sense of that which has no meaning in itself, is just there to be explained largely by the resistance which matter offers to the development of form. There is a certain amount of difference in the world, and Aristotle preserves it and makes use of it in his general theory of the universe. The source of efficient causes, the reasons why things are different is this: different forms have different histories. Of course, the species as such are always there. One can see what an insignificant part the whole mechanical theory plays in this view and how completely teleological it is.

We shift the picture; in modern science we get certain laws with the implication that the whole of the universe can be looked at under these laws. From that standpoint the Aristotelian substances, species, just happen; they are contingent. For

Aristotle the values and meanings of the world are necessary things, and what answers to the mechanical view is contingent, just happens. For us there are living things, and there are sensitive things, and there are conscious things, and there are colors and sounds, but they just emerge from mechanical situations. Their contingency is plainly contingency over against this background of a certain sort of necessity, and that sort of necessity does, as I see it, attain the necessity which science gives to us. It may be decried as mechanical, as being abstract. It is possibly somewhat dependent upon a research science, but it does give us control.

In the mechanical theory the individual rebuilds the world. The contingency is definitely or distinctly determined over against this background of necessity. The scientist has succeeded in isolating the physical object which he could exactly define and in working out a mathematical technique by which he could break up this process of change, and through that he has attained his hold on nature. Then, having got that hold, it is possible to make application of it in building skyscrapers and airplanes. Our mechanical nature is a result of that sort of abstraction. Whitehead's *Science and the Modern World* gives one of the most illuminating histories, I think, of the development of science and philosophy through the Cartesian period. Not the chapters on God and the quantum theory, but the other chapters are the ones that give an enlightening presentation, especially this isolation of a causative future which can be dealt with. There is a field of causation which Renaissance science has set up. In dealing with the contingent, there is nothing but the theory of probability, but it is only legitimate to recognize that this particular sort of causation is something that has been, so to speak, wrung out of nature by the ingenuity of scientists who are passionately determined to get some universal laws. They sought for that which was necessary, that sort of uniformity in which one event necessarily follows another. It is a sort of necessity which takes place, whose values are contingent. What we term "causation" is the statement of the situations within which

these contingent events appear. Given a mechanical statement, the ideal of which is the distribution of the physical particles in the universe, we find that certain values appear. The theory of causation is the determination of the conditions under which they appear. We have to keep in mind this abstraction to find that which is uniform. Then we have that which we can depend upon. It is the stuff out of which we can get the ends that we are after. There is a certain sort of necessity there, abstracted from the particular ends. We want a general technique, a universal science, and we will take care of the application ourselves.

How legitimate is the contingency of the end over against the statement of the means? The means must be adaptable to any end; the end is contingent in so far as it is such a universal statement of the means. If the theory of building materials confined itself to cottages or skyscrapers, it would not be a satisfactory theory. We want to have our statement of the universe as uniform as it is possible. We want to be free from the determination of the ends, and we want to have a statement of the means which will be utilizable for any of them. There is no necessity of ends which is reliable from the point of view of any perspective, something necessary in the sense that the mere passage of events carries on essential characteristics as in the causative future. There is in the latter a causation which is highly valuable, and it is of definite importance from the point of view of our interpretation of the world that ends should be contingent so far as this sort of causation is concerned. Causation, then, becomes a statement of this particular order that will make possible any particular end, which is in so far contingent. That is the statement of the conditions under which this particular end can arise. The process of that end as stated in these abstract terms remains necessary; that is, the relationships that exist between the physical particles that make up the stones that get into the skyscrapers are necessary, although that distribution which we find at any one time will be a different distribution from the point of view of another perspective. It will be a skyscraper in one case, and it will be part of the mass of the planet in another

case. The same laws obtain, but we do have an entirely different world because the order is an abstraction: it allows of different points of view.

What is the relationship of this sort of necessity and the probabilities, as we term them, under which certain things emerge? We spoke of that as causation, but it is evident that the causation is of a different character; and it is the relationship of these two kinds of causation that we want to consider, without confusing the two different lines of relation. They are evidently very different: the statement of the world in terms of physical particles in their fields of force which carry with them different distributions, and then this appearance in the form of perspectives in which the other contents of the world are related to mechanical necessity. I have connected this with the means and end relationship because it is the sort of relation in which the problem arises. I have so much money in the bank. I can utilize it for a vacation trip or put it in a bond. I have a world of economic realities, and I abstract from all the ends in order that I may utilize it. I want to look at it from every point of view. In other words, the ends must be contingent. I must get a statement of an economic world of means for which any end to which I put it is contingent. This is likewise true in technology, which is not an exact science. Now given a certain end, what will be the calculation of means which will achieve it? The physical scientist has simply generalized this sort of attitude which we take toward the world in giving us the most universal statement of nature. There is the necessity which lies in the whole statement of the means, and then there is that sort of selection of means which is fitted for the emergence of some sort of contingent ends or values. One lies in the field of probability, and the other in the field of necessity.

I have presented necessity as it appears in the continuity of nature, through the characters which continue in a passage where we have identified the characters that do appear in this continuum with the very passage of nature that carries with it the necessity that is involved in those characters. What the

scientist's study of causality consists in, in this sense, is finding out those characters, those Aristotelian adjectives, that do inhere in the routes of passage and, consequently, involve the presence of their causative futures. We find this attitude to be taken not simply with reference to the processes which mechanical science studies. We also make use of it in studying the causal nature of other phenomena, other events, where we speak of the individual, for example, as determining his own future, as responsible for his own conduct. What we attempt to present is a series of events or a continuous event in which there are certain lasting characters in so far as we can identify these characters with the experience of the individual; so far as they persist, we find what we term causality of this type. The success in obtaining such characters, of course, is very varied. The expression of it to which I have just referred we discover in ourselves. In the very being of persistent characters in our conduct we are determining ourselves and other things about us.

XX

PASSAGE, PROCESS, AND PERMANENCE

NEWTONIAN relativity recognized that uniform translation in a straight line provided no criterion that could determine whether the relative change of position of two bodies or systems of bodies with reference to each other was due to the motion of one or the other. Einstein has generalized this so that translations, not only with uniform velocity but also with accelerated velocity and in changing directions, may be stated in terms of relative change of position, the laws of nature which formulate the resultants of motion being equally satisfied whichever system or consentient set is conceived to be in motion or at rest. The outcome of this doctrine has been the statement of change in nature in geometrical form, but it is a geometry that includes time as one of its dimensions. Thus there appears an entity that has position not only through its relations to other entities in a timeless space but also through its relations to other entities in temporal passage, for a timeless space, that is, a space that is abstracted from its temporal dimension, can maintain its structure only with reference to one determinate order of passage; if entities are succeeded by different entities, their spatial relations will all have changed. The whole spatial organization of a Ptolemaic world is different from that of a Copernican world, however successfully one may translate from one to the other. The difference in these organizations depends upon whether the order of passage is the rising and setting of the sun, or the revolution of the earth. An extension that includes temporal passage in its dimensions, thus allowing for an indefinite number of orders of passage, or time systems, can have no absolute timeless space; and no such absolute space can be found in nature. The ultimate entity in this four-dimensional geometry is, then, not a point but an event.

The position of an event can be determined in a determinate order of passage or a certain time system by spatial co-ordinates. By a determinate order of passage it is meant that throughout a duration, which may be identified with what the psychologist has called a specious present, the organization of a consentient set persists. Such an organization in the midst of an indefinite number of time systems can only be defined with reference to some event that extends throughout the duration. Such an event is identified with the physical individual, or, as Professor Whitehead terms it, the percipient event,¹ because only in connection with this do we find the persistent character of here and there which can define such a consentient set in the duration of a now. These durations or specious presents so overlap that it is possible to abstract from the temporal passage in the persistence of the organization of the consentient set in its relation to the here of the percipient event, or physical individual. Objects which occupy these events of the consentient sets would be at rest, while objects within such a set which are said to be in motion occupy events which do not maintain this relation of here and there to a percipient event. The events which are occupied by the rails are succeeded by events which have the same organization from the standpoint of the here and there of the observer, while those which are occupied by the train passing over the rails are succeeded by events which have a continuously different position in that organization. Within the train there is a persistent here and there organization, while the events of the landscape have continuously different positions with reference to this consentient set of the interior of the train.

The events do not move. They are extended over by different events according to the time system in which they lie; or, if by Whitehead's method of extensive abstraction we reduce them to ideal elements without temporal breadth, we can speak of them as succeeded by different events. Thus the same set of events may lie in two different time systems. As the train passes

¹ See A. N. Whitehead, *The Concept of Nature* (Cambridge, 1920), p. 107.

the station, to the man on the station platform and to the man in the train there is the same level of events at this ideal moment, but to each observer the events on this level are succeeded by different events, to the one by the flying windows of the cars and to the other by the flying telegraphs poles, or rather by the events occupied by these objects. If this common level is intersected by another level, a rect is produced which would be occupied by a straight line in the spaces of these different time systems, and a fourth intersection would give a punct.² It is an empirical fact of nature that no further division is possible by intersections. In this manner position may be obtained for this punct, or event-particle, but this position does not lie in a single space but belongs to all the spaces of the different intersecting time systems. Position, then, refers to the possibility of ideally reducing an event to a limit through the intersections of different time systems. Four such intersections give it position in the passage of nature in the sense that its relation to no other time system or succession of events would restrict its spatio-temporal extent any further, but it gives it no unique absolute spatial position, since answering to each time system there is a different spatial organization. Thus the geometry of such a four-dimensional extension is a very different one from that of a timeless space. By means of this restriction the event-particle, or punct, is located in the rects, levels, and volumes of four-dimensional extension, and thus in the different instantaneous and timeless spaces of the different time systems. A timeless space is a space of a consentient set which, through its lasting relation of cogredience with a percipient event, lies in a determinate time order or system, and may therefore be abstracted from the temporal dimension. There will, therefore, be a timeless space answering to each time system, upon the supposition of its cogredience with some percipient event.

As before remarked, an event arises as the ultimate entity of abstraction out of the assimilation of space and time as the four dimensions of extension. Spatial relations pass. Whatever,

² See Whitehead, *The Principles of Natural Knowledge* (Cambridge, 1919), pp. 115 ff.

then, is defined entirely in terms of extension, spatial as well as temporal, passes but does not change, for change implies something that does not pass. Scientific theory is largely occupied in the resolution of physical change into the diverse spatial and temporal relationships of permanent objects. As long as we accepted an absolute timeless space, this permanence of the physical object could be conceived of as the effective occupation of a certain spatial volume; but, if this spatial volume passes, its occupation ceases and with it the permanence of the object. We find ourselves with a set of passing events which simply disappear, and objects which must surrender their spatial characters to preserve their permanence. Permanence thus involves not only taking the object out of time (as we do in so far as we consider it as permanent) but also taking it out of space, since space passes also. At the most we can speak of the events as being pervaded by a permanent character, but the character cannot be spatial.

It is space that has provided the permanence within which the temporal process could go on, and it has been to the spatial characteristics of things that we have come back in our search through scientific analysis for the permanent characters of the objects, for the uniformities of nature, its laws, have had fixed spatial points, lines, and volumes by which to determine them. When space passes, there is nothing but passage over against objects which as objects are not in space or in time and cannot be if they are to retain their permanence. An event, then, is that which passes, or happens, but not in or by something. At most its passage can be over something, but this passage must be over other events, which are also passing. Such an event is an abstraction that is forced upon us if space passes. It is an abstraction, for objects remain situated in events, and passage takes place in experience in the above-described timeless spaces of consentient sets, cogredient with percipient events.

Much the same can be said of motion. In a passing space there can be no motion. There can be merely events that pass and cease. There can be events which are coincident and those

which are not coincident, but these do not constitute motion, which can take place only with reference to that which is at rest, that is, with reference to that which does not pass, in so far as motion is a passage from place to place. A timeless space is essential to motion and is provided for in Whitehead by cogredience. Here, again, the event is an abstraction that is forced upon us by the assumption that even timeless spaces are passing. It is an abstraction that is forced upon us by a logical analysis, not reached by fastening attention upon one character rather than another. All our experiences do take place in timeless spaces, and we can reach an experiential recognition of the passing character of spatial structure only by transferring ourselves to another consentient set with which we become cogredient. Our own timeless space ceases to be timeless because we have transferred ourselves to another timeless space. This does not, of course, invalidate the arguments for relativity, but it suggests the query whether there could be an experience to which an event is native. It would have to be one in which there would be neither objects nor motion.

One of the great contributions of relativity has been that it has accustomed us to the recognition that the determining relationship of the individual or percipient event to the consentient set is a fact in nature and in no sense involves subjectivity or what Whitehead calls the bifurcation of nature. If there were one absolute spatial and temporal order of the world, the different worlds of different individuals would seem to be experiences which should be located within the individuals; but, in a universe which is stratified by the selection of a time order by a percipient event, these stratifications are in nature and not in the individual, and we are at liberty to conceive of an evolution of such experiences which has followed the evolution which we ascribe to the forms themselves.

Let us, then, step back of the distinctively human experience, with its achievement of a mind—that is, an individual that addresses himself as he does another and uses symbols, an achievement that seems to have arisen within social conduct—

and perhaps its earlier achievement of the physical object. The latter object arose out of the break in the act which begins with an impulse seeking a stimulus at a distance and ends in the completion of the food, or sex, or parental process, or in escape, or rest and sleep, or a like physiological state. The break was made by the human hand, which in its manipulation stops short of the physiological completion of the act and finds a temporary completion of the act in the contact experiences of passive and active touch, in contact. Out of this arose the physical thing in its abstraction from the final stages of the act—mere matter which under the crumbling analysis of the hand suggests the hypothetical atom.

Without entering the contentious field of the history of this evolution, I wish to consider the character of an experience within which there is neither a self or mind nor any mediate field of physical things lying between the inception of the act and its physiological accomplishment, and I wish to consider it, first of all, from the standpoint of its extension, which in human experience has been separated into space and time. Extension in this experience would represent awyness, distance, and a separation in which there would be no distinction of space and time. The action which overcame or increased this separation would have aspects which for our analysis would lead to this distinction. For example, the rhythmical steps by which the separation would be overcome sets up something which, when repeated often enough, exhausts the distance which appears in vision; but repetition implies an extension in which the same thing can recur, that is, it involves a temporal phase which is divorced from that which recurs, whatever the form in which the undifferentiated situation may exist over against individuals whose conduct involves neither a recognizing self nor physical objects. In Whitehead's analysis motion involves a persistent here stated in terms of cogredience with a percipient event and the relation of physical objects to a space which is divorced from time.³ The first provides a timeless space within which the

³ See Whitehead, *The Principles of Natural Knowledge*, pp 78 and 82; *The Principle of Relativity* (Cambridge, 1922), p 70, *The Concept of Nature*, pp 109-10, 188.

motion takes place, and the second a timeless object that can recur in different positions of the timeless space.

Both the persistent here and the physical object belong to the mediate world of contact experience which breaks the whole act that terminates in a physiological conclusion. The perspectives of distance experience are ordered, reduced, and regularized through their relations to the co-ordinates of the immediate contact world, but this order, reduction, and regularity are not essential to the functional value of the distance stimuli. A cogredient world not only is an extension of the co-ordinates of contact experience but is also a world made up of objects that have the abiding character of the percipient event, or physical individual. That is, rest involves not only permanence of location but the location of a physical object, and a physical object is either one of actual contact experience (one that effectively occupies space over against the resistances of the surfaces of the hand and body) or one that hypothetically so occupies space at a distance. It must not be forgotten that the body of the individual only becomes an object as other physical objects appear in experience, for they are essential to the delimitation and orientation of the body, and that the content of effective occupation of space is a common content of the body and of other physical objects—it is not projected into the physical objects from the body. The peculiar importance of the body does not rest upon its primary differentiation as a physical object. Nor is this alone true of what may be called the outside of the physical object; it holds also for the inside of the object.

The internal structure of the organism of the individual stands upon the same level as that of other physical things, i.e., it has to be reached by a dissection. There is, however, what may be called the qualitative inside of an object, which is never reached by a dissection, since this only reveals new outsides. This inside is identified with what may be called its center of activity and finds its primary expression in the organism, but it is to be noted that this activity can be referred to the organism only when the organism has become an object, a physical object, as one among a group of objects which mutually deter-

mine each other. Just as the effective occupation of space can be referred to the organism as a physical object only as the organism is delimited by and regarded from the standpoint of surrounding objects, so action and reaction can be referred to the physical organism only in so far as this action and reaction is defined by and regarded from the standpoint of the action and reaction of the surrounding objects. It is, however, important to recognize that contents can appear in experience without their being referred to objects, and especially that such reference cannot take place until objects have appeared. The reference to the organism takes place logically in the same fashion as the reference to other objects, that is, the standpoint of the reference must be outside the organism. The man who catches a thrown ball characterizes his own resistance by the force of the ball. The character of activity is shared by all physical objects in the situation with the organism and is ascribed to the organism as an object only so far as it ascribed to the other physical objects. The physical object is probably an abstraction from a primitive if somewhat vague social object, and the mechanism of reference is involved in the appearance of the self as an object. Here also the social objects stand upon the same logical level with the self and are essential both for definition of the self and for the standpoint from which the self is regarded as an object. We are, however, interested now in the physical objects in their spatiotemporal relations.

Such an object has an inside in so far as it acts in reaction to the individual organism, but no more than its external characters does this character belong to the stimulus as an object before the physical object has arisen in experience. Relatively identical stimuli will succeed one another, and there will be relatively uniform responses in the organism to these stimuli, and the responses to frequently recurring stimuli will attain facility and promptness, but there will be no objects in which these relatively identical characters can inhere, nor any selves to which these habits belong. Without the permanence of the object either in the environment or the organism, there will be

nothing but events, and the identity of the characters of these events will have no medium within which they can crystallize. To the reflective observer the likeness of color, odor, and form of the recurring stimuli will reflect itself in habitual responses, but in the experience of the lower form there will be nothing but the recurrence of stimuli and responses, without comparison or reference, though in the conduct of the form there is selection and organization. Everything will happen and disappear. Time will be a dimension of all experience. In such experience rest, repose, and sleep will carry with them no permanence but merely the absence of change and effort. Though one specious present or duration merges in another through absence of change and effort, and balanced attitudes answer to these situations, the pulses of existence will succeed one another without permanence, identity, or thinghood. Nor will motion be aught but continual readjustment to stimuli which capture and hold attention in continually changing positions. Motion as the passage of an identical thing will not obtain in such an experience. What we call the animal's own motion will bring its claws and jaws into contact with the prey seen or smelled at a distance, but there will be no merging of the visual image with the memory image of that which has been devoured to form a percept of a permanent and identical character in the constantly varying experience, though the perfection of adjustment to the changing distances of the prey, and adaptation to each succeeding stage in the act, reflects just such a permanent object to the reflective observer.

I wish to lay emphasis upon the relativistic standpoint which I have occupied in the statement just made. That standpoint as stated by Whitehead recognizes that a consentient set exists only in relation to a percipient event, but Professor Whitehead insists that this relation exists in nature. He calls it a stratification of nature. The percipient event in his account does not include mind. The percipient event is only the physical location and apparatus of mind. As occupying this location, mind is within nature, but the relation between the body and its con-

sentient set or environment is a phase of nature of which mind is aware. It is not a state of mind. The *sensa* to which he refers are parts of nature, not of mind. The selection of a time system by the percipient event, which is tantamount to the determination of a sentient set, answers, then, not to a subjective experience but to an environment which is existent in nature, though dependent upon its relationship to the specific individual for its existence as an environment. Nature has an infinite number of aspects, but they are aspects only with reference to percipient events or individuals, actual or implied. The aspects of nature are, then, not aspects of an absolute reality of which the aspects are restricted and imperfect copies, but each aspect is a complete slab or stratification of nature within a certain duration or temporal spread. All of them may be required for the whole of nature, but they do not fit into one another to give an absolute nature, though it is possible to translate from one to any other. It may be possible for two men, one in Chicago and another in Peking, to adopt the so-called co-ordinates of the fixed stars and translate their views of the heavens into a common sentient set, but this sentient set is but one among the infinite number of possible sentient sets, for the stars are not fixed, and there is no absolute set of co-ordinates to which all others may be referred. The co-ordinates of the fixed stars constitute a convenience dependent upon selection of the socially organized group of individuals or percipient events in the presentation of stellar events. In the spatiotemporal structure of nature, relativity, at least in Whitehead's statement of it, recognizes the dependence of the environment upon the form for its existence as an environment.⁴ The spatiotemporal environment is relative to its percipient event or individual, and not to an absolute world. In the place of a relation to an absolute enters the possibility of transforming the equations descriptive of objects and changes in any one sentient set into equations descriptive of corresponding objects and changes in any other sentient set within which the same events may be conceived

⁴ *The Concept of Nature*, p. 188

of as situated. In a sense there exists an absolute universe of events, but the spatiotemporal separation of these events from one another and their succession may vary in the different consentient sets. There is no absolute world of things.

In the experience, which I have suggested, of animals without minds and physical objects, there would be no things, no permanence, no sameness. There could be no sameness (for sameness involves reference, and this involves mind), though the characters would be there which under reference would be identical. The so-called sensuous characters would be present for a reflective observer in the same consentient set and also the habitual adjustments which we interpret in terms of the identity of the stimuli. The spatiotemporal extension of such an experience would seem to correspond exactly to a world of events such as results from the recognition that time is one of the dimensions of extension. However, these events would be occupied not by objects, whether the physical selves or the things about them, but by sensuous characters. These characters would include what we call effort in the organisms and force or energy in the physical objects which are in interaction with the organisms. Whitehead refers to characters so occupying events as pseudo-adjectives⁵ and adjectives which pervade the routes of events, but these characters are conceived of by Whitehead as having the permanence of that which does not pass. In the experience suggested above, these characters would be present but would pass, that is, they would be events, and we have no difficulty in presenting this phase of such an experience, for, if anything passes, certainly the color of a fading sunset or the warmth of a dying fire does. Passage does not involve a content that does not pass. It involves simply happening, a coming into being and going out. Change involves departure from a condition that must continue in some sense to fulfil the sense of change from that condition. As an illustration of the distinction I may refer to the reading of a sentence when the mind is occupied with other things. The distracted individual may recall

⁵ *The Principle of Relativity*, pp 30 ff

the sentence and get its changing meaning, but the passage of the words took place without any background against which the sense develops when it is comprehended. When the word was read, it was gone, and no persistent relational meaning bound the passing symbols together in a persistent nonpassing content. Such words were events, pure and simple, but they were contents, however slight. So in the experience I am suggesting all the sensuous contents may be conceived of as passing. The sameness of the green of one event and of the green of the next event would arise for a more developed intelligence which could indicate this to another or to himself, but it would not be there in the experience of the lower form—only the events each with its momentary green would be there.

The spatiotemporal character of such an experience would be just what Whitehead depicts as that which results from the consistent recognition that time is a dimension of extension and that so-called spatial configurations pass. The recognition of this not only wipes out the permanent physical object but introduces the possibility of different time systems among the same events. Which tree succeeds another tree depends upon the direction in which the animal is moving. Of course, the intimation just given that the animal is moving implies a consentient set which is at rest and objects which preserve their identity—a timeless space and permanent things. Within such a situation there is but one determinate order of succession, and persons moving in different directions within that field would always find themselves cogredient with the field which is at rest. The different succession of trees would be for them illusory appearances of their own motions. In the experience which I am assuming there is no motion; there are different successions of the same events. That these events are characterized by experiences of effort and force, together with other characters which to the reflective observer remain identical but which in the experience of these animals succeed one another and disappear, does not constitute them motions. There are limitations to the time systems and to their corresponding spaces, just as there are

limitations to the distortions due to visual perspectives, which are expressed in the fact that they can all be translated into one another, or more generally by the fact that there is one passage of nature in which events extend over events which are parts of them. Thus in a Ptolemaic or a Copernican world there is the same process of the seasons, the same years, and the same succession of the eclipses. Within these limitations any temporal perspective, answering to any percipient event, is as legitimate as any other and constitutes a genuine stratification of nature. It is a real relationship of the universe to an individual. In an experience in which there are no physical objects and there is no motion, there will be not only this passage of nature which covers all events, but also events with such varying temporal dimensions that the spatial structure of the events that succeed them will be continually different, with corresponding differences in the sensuous characters that occupy the events. These differences will be registered in this experience not as differences, i.e., there will be no comparisons, but as the events which make up what we call the bodily life of the animal and the feels which occupy them. In such an experience there will be no consentient set, for this implies an identity of spatial structure over against passage and a comparison with the changing order consequent upon the varying temporal dimensions of certain events. Nor will there be any crystallization of characters into objects.

Relativity in such an experience seems to come back to the indeterminateness of the time dimension in its relation to the so-called spatial dimensions. If we abstract from the time dimension, that is, if we accept the timeless space of our own experience, space is within that experience determinate, and the geometry of such a space, given its axioms or postulates, is a deductive science. Admit time as a dimension in a world in which there are no consentient sets, no objects, and no motion, and it is entirely indeterminate whether one event will be succeeded by any one event or another in the duration. There will be no repetitions, for there will be no sameness, no spatial structure that repeats itself and, therefore, no historical routes that

answer to points in timeless spaces. In conceiving such an experience, we are not at liberty to read back into it the structure of our experience with its cogrediences and consentient sets. From the standpoint of a reflective observer, objects, motion, continuous objects, and identity may be there, but the experience in which these are found is not the experience answering to the type of individual to which we are referring. Such an observer is the condition for the appearance in his experience of that which lasts during the duration, just as an animal with the power of digesting and assimilating what could not before be digested and assimilated is the condition for the appearance of food in his environment. It is not enough that the individual lasts through the duration to give rise to a persistent here, in Whitehead's sense. If the percipient event passes with the duration, there will be no persistent here. Persistence involves an individual who holds on to what is passing during the duration, or specious present. In such an experience a passing green may be the same green in the succeeding events. If the vision passes with the green of the earlier event, there will be no persistence, though from the standpoint of the experience of the reflective observer the green persists. The individual in whose experience there exists that which lasts is an individual who not only has vision of the green but also has as a terminus of his experience his own later responses to the green as a stimulus, for then, in a fashion, the whole act is there. The mere presence of the tendency to respond in the passing experience would not carry with it the persistence of a character. Taken by itself, it would be but another passing phase in the experience. In an instinctive or entirely habitual act, the mere readiness to later response does not endow the experience with permanence of characters; but where there are alternative later responses which keep attention centered on the stimulus, bringing out now one and now another character which mediates these different responses, there appears permanence—which may be defined as an expression of the relation between the individual and the content of stimulation. In this relation, while there are alternative responses, they

fall within a common contact manipulatory process, and the elements in the content of stimulation which tend to call out this response remain in all the alternative tendencies to response. In so far as the organization of the act is taking place, the merging of these in a temporal whole appears. The content lasts with a constant core over against changing phases. This does not involve the experience of sameness (for this requires reference) but that that in the stimulation content which answers to the contact reaction within which the alternative responses lie, and which is essential to these responses, may appear as lasting, while the attention passes from the contents that answer to one alternative response to those that answer to another. Stating the position generally, until there occurs an interruption in the act such that a certain content in the field persists while other contents shift, there will be no lasting content and no lasting experience. When the organism must hold on to one content as the condition for the organization of the responses that tend to complete the act, there may be in the so-called specious present that which lasts; otherwise events and their contents will simply pass, irrespective of the continued identity of the characters from the standpoint of a reflective observer.

The lasting character of such an experience will not be found primarily in the so-called sensuous content of the stimulation but in the persistent attitude of the form toward it, though the persistent character of the attitude is mediated by this content, and the attention of the form will be found centered there. The situation involving both the form and the environment is that of the relation of different outcomes of the act to this orientation, while up to the point of contact the act is identical. It involves the whole field organized from the standpoint of this content of distant stimulation. These competing tendencies to ultimate response hold in check the movement toward the object and determine the contact reaction and manner of approach. During this duration, and others that pass into it, the balanced attitude of the form and that in the content of stimula-

tion which mediates this attitude may together become that which lasts. It is the persistent here of the sentient set. The whole merges together without distinction between the persistent orientation and the sentient characters occupying it. The attitude does not change, nor do the stimuli that mediate the attitude, and this attitude stands out over against the different tendencies to ultimate response and the stimulations that answer to these.

While I am confident that this critical situation is that within which the lasting element in experience appears, I recognize that in the statement given I have not succeeded in showing how, out of an experience that passes with the events in the experience, there arises that within the experience which lasts. I have insisted that the so-called sensuous content of color or odor not only can occupy an event but also can pass with the event. If we speak of the relation of the form to its environment as that of sentience, that which takes place within the form in the experience of color can pass also, and in such a situation, no matter what the account of it might be which the reflective observer would give of it, there could be nothing that lasts. Nor, in the account which I have just presented of a situation within which that which lasts arises, does there seem to be anything more than passing sentience; for the fact that accompanying certain contents of stimulation there are to be found certain identical characters does not make them identical in the experience. The presence of identical elements in the experience from the standpoint of the reflective observer does not introduce this identity as a character in the experience of the form whose sentience passes with the events.

This entire account has carried with it an implication that sentience—the attitude of the individual in so far as that attitude determines the environment and is determined by it—is a character in the percipient individual that corresponds to the character in the content of the environment, that it is representative, that it is “of” something, that it has a cognitive value, that it is a sensing, that it is a consciousness. This is an implica-

tion which I wish explicitly to get rid of. The relation of the individual to his environment, in so far as the individual determines the environment and is determined by the environment, is certainly not a cognitive relationship. It is selective, constitutive, causal. It may be difficult to banish the correlation of the image on the retina and the visual object, but it is an utterly misleading relationship.

The cognitive relation presupposes the presence of that which is cognized. If we abandon with Whitehead the bifurcation of nature, the colors, sounds, tastes, odors, and temperatures are there in nature quite as genuinely as spatiotemporal extensions; but, according to Whitehead, these entities, or pseudo-adjectives, are objects because they do not pass. Over against this position I have maintained that whether they pass or not depends upon the nature of the individual whose selection is responsible for his stratification of nature. In the experience of a form in which nothing lasts, I see no reason for assuming that there are not colors, sounds, tastes, odors, and temperatures which do not last. I think we find abundant illustrations of such in our own experience. Their lasting character depends upon the already noted difference in our experience and upon the individual who makes such an experience possible. Their character as objects, as termini of thought, moreover, seems to me to represent a still further advance in the evolution of experience, namely, when within experience cognition takes place. In all these types of experience (that in which there is nothing that does not pass, that in which there is that which lasts, and that in which there are objects that are cognized) there is color and all the rest of the adjectives and pseudo-adjectives. Whitehead seems to allow for stratifications of nature only on the basis of the selection of a time system by a percipient event (I would say by an individual) and on the basis of his persistent here throughout a duration, i.e., his cogredience. This persistence seems to me to posit a lasting character of the experience which calls for an explanation. Furthermore, the selection, which Whitehead refers to as that of the best operative past, involves much more

than he offers in his statement of cogredience. It seems to me to be found in the mutual determination of form and environment, as illustrated above in the appearance of food. An animal with a new digestive apparatus stratifies nature as genuinely as the percipient event with a persistent here. What the individual is determines what the character of his environment will be.

The individual form that interrupts his complete physiological act in the manner described is a different sort of an animal and has a different sort of an environment. He has otherwise stratified nature. The difference of principal importance here is that not only do the persistent heres of succeeding durations merge into one another, as Whitehead insists, but the contents of these events merge also. Thus the experience of effort on the part of the organism and that in the stimulation content which mediates this effort so merge. It is that which is involved in this merging that it seems to me is not brought out in Whitehead's presentation. The passage of one here into another here will not be present as an unbroken here unless its unbroken character has become critical in the experience. As I have before insisted, passage of what from another standpoint is identical may not be the passage of an identical character if the events in the environment and the individual simply pass. It is true not only that there can be no motion without rest but that there can be no rest without motion. Rest is the field of motion, and persistent heres or cogrediences merge into such a field because the motions or tendencies to motion of a living form have this common content from which and with reference to which they take place. It is the divergence of the different motions that is responsible for the merging of the common content of the field of rest. For an individual whose conduct consists in unbroken straightaway acts there would be no such field, or merging of events and their contents. An individual, however, whose conduct involves the selection and organization of alternative responses from a given situation must hold on to this common situation in the selection and organization of the responses in the act.

What I am undertaking to bring out is that the appearance of such an individual (an individual in whose conduct there are acts with alternative responses within a framework of the act which remains the same) is responsible for the appearance of an identical element in experience. What is critically novel in this individual is the existence of the life-process not simply as something that is going on but as the events in the process which are before and after and yet are present determining the current events. Both the causal and the functional values of the events that are going on, the conditions and the end, the reasons for these events from both standpoints, are there in the individual and in his environment. Both the food process in the individual and food as food in the environment involve the determining character of the past and the future in the passing events. Whitehead seems to recognize this in what he calls the causal future⁶ of the event-particle. In our experience this appears in the distance experience in so far as its contact values merge into the distance values. We see, hear, and smell things as those which we may touch and grasp. This value of that which is present as sight, sound, or odor is not simply a tendency in the individual plus perhaps an image of the contact.

In the specious present there is more than an instantaneous experience of effort. The temporal spread of the experience includes that which is later and that which is earlier, and there is determination in both directions. We call it a present, though some of the past and future is included within it. The causal determination works forward. In the living form that which is going to happen works backward. We call this control within the life-process. In the specious present this control works immediately, but immediacy here is not instantaneity. The ongoing events control the action of the individual. The very events that are taking place effect an ongoing process. We are likely to state this control in our own conduct in terms of consciousness, but it is present in the plant as well as in the animal. There is a living process there which refuses to be stated in

⁶ See *The Principle of Relativity*, pp. 31 ff.

terms of causal determination. It is, of course, possible to translate action, in terms of the past, into motion, but this fails to convey what appears in experience as effort or action. The characteristic of action is that within the immediate temporal spread there is a something going on which is controlled by the later events. For purposes of our own control we confine the term "future" to what lies beyond this specious present and state this in terms of a presented past in a causal series. Because of the indeterminateness of the temporal succession, this statement is necessarily in varying degrees hypothetical, but it is a hypothetical extension of the future in the specious present.

In the twisting of a plant toward the light, the later effect of the light reached by the twisting controls the process. It will be in the direction which provides the maximum of illumination. Within the temporal spread of a present the later events control a process which continues throughout the whole. If this is stated entirely in terms of the past, there is no control, and there is no such entity as a process—nothing but successive changes of position with redistribution of the energy involved. This would provide a causal account. It would give the reason for the change of position in the causal sense of a reason for the change. If we assume a tendency to twist toward the light, a process which in a temporal spread is a reality throughout, the control by the later event of greater illumination is the reason in a final sense. A mechanical statement denies the existence of a process and justifies itself by the possibility of making a complete statement of the occurrences in terms of the results of motion alone. If the present is reduced to an instant, no such a thing as a process can exist, except in a so-called idea of a series of such instants, and even this could not exist without what we call a specious present, i.e., a present with a temporal spread. A living process is a series of events that are moving toward a terminus and is controlled in that movement by the later events in the duration.

A living form, then, stratifies nature in the sense of its process, i.e., it selects its environment, that to which it is sensitive,

those events that control the living process. If we state this process entirely in physical and chemical terms, we come back to physical particles which have at most fields of force or Whitehead's causal futures. The question is whether in this abstraction we are abstracting from something in nature that is there. Is there such a thing in nature as life, and is there such a thing as control, in any sense but that of a so-called mental interpretation? In the latter case we would deny life to the plant, while we might ascribe it to the animal that we endow with a forward-looking consciousness, in which tendencies and impulses may appear. It is my assumption that there is such an entity as life in nature, living forms, and light and food in their environment and that these exercise control.

A definition of life in terms of physical science, since this states the world in timeless spaces that answer to durations that are reduced to ideal instants, is bound to be mechanical, since it allows of no spread of existence within which a process can exist. It also has no place for a living process, since its statements are all in causal series, in terms of a past actual or presented, not in terms of a future with an indeterminate time dimension. I take it that the indeterminateness of the time dimension of extension introduces the possibility of contingency in nature. There can be a selection of a time system, i.e., of the events that are to succeed the immediate events, but there can be no selection without a reason, and this reason must be found in an existent succession that is a reality as a whole, that is, in a process.

A living individual is one that lives in the future, i.e., it is sensitive to that which controls the expression of its impulses, its life-process. Now in the experience of such an individual there can appear a timeless space. A timeless space is one in which abstraction is made from the time dimension because of the cogredience with a duration of the percipient event or individual. Whitehead's statement of cogredience follows:

When an event has the property of being a percipient event unequivocally here within an associated duration, we shall say that it is cogredient with

the duration. An event can be cogredient with only one duration. To have this relation to the duration it must be temporally present throughout the duration and exhibit one specific meaning of "here." But a duration can have many events cogredient with it. Namely, any event, which is temporally present throughout that duration and in relation to an event here-present defines one specific meaning of "there," is an event "there-present" which has the same relation of cogredience to that duration and (to that extent) is (so far) potentially an event "here-present" in that duration for some possible act of apprehension. Thus cogredience is a condition for a percipient event yielding unequivocal meanings to "here" and "now."

It is the persistent relation of "here-present" and "there-present" which constitutes cogredience with the duration; that is, they last throughout the duration in this relation of cogredience, and abstraction is made from the time dimension.

But abstraction is made in the experience only in so far as this lasting here-present and there-present in the duration becomes a field within which the different phases of the distant stimulation, which are competing for the control of later phases of the act, build up an object that may mediate any one of these alternative responses. Thus something in the road ahead of one becomes an object in so far as one may heave or push it out of the way or go about it or leap over it. It is an object with all these possibilities of response, all these characters, in that for all of them it retains its there-present character over against the here-present character of the individual. The definition of its lasting there-presence is that it is there for any one and all of these completions of the act of reaching it. Otherwise cogredience would be a persistence of the here-present and the there-present for the reflective observer, but the persistence would not characterize the duration which is determined by its relation to this percipient event or individual. A timeless space is, then, that spatial organization determined by physical objects which invite to different contact responses when an identical response of reaching the object is the condition of carrying out the contact responses.

It is the identity of this earlier part of these different acts that abstracts from its temporal dimension. It does not ab-

¹ *The Principles of Natural Knowledge*, pp. 70-71.

stract from the spatial dimensions of this part of the act, for these are determining stimulations in the act, while the identical passage of the organized spatial field and of the percipient event or individual has no bearing on the act or acts. It is evident that this abstraction takes place only within an act in which the later event, the future, is determining a process which is itself responsible for the stratification of the duration in the interrelation of form and environment. It is, of course, the moving physical object that is of earliest interest in the conduct of the form, that is, the physical object with an indeterminate time dimension; but, while its movement lends it acute interest, it does not provide the conditions for abstraction from the time dimension of the field at rest. These conditions are those that lead to the appearance of the physical object and have been already recited. Such a living being not only determines an environment but has as a content a process in which the later events in the experience control the acts which express that process. This content in the individual appears as tendencies, i.e., a series of events which not only advance to a certain set of events but show a certain direction in the relation of the events to one another which exhibits itself in the fact that what takes place in a specious present, a duration, is there as a whole, and that the ongoing phase controls this whole, the active future directing the process. Furthermore, the adjustments within the organism for later phases of the act may be sufficiently present to influence its immediate expression. It is this latter character of the act which is of peculiar importance, for when there appear conflicting adjustments answering to characters in the distant field of stimulation, there results, or may result, an inhibition of the act. It is then that the process within the specious present appears as a whole and gives rise to the lasting phase in experience.

What is involved in a process is not simply a continuity. This is given in extension. One event extends over other events. A process involves the past as determining the fixed conditions of that which is taking place, and it involves that which is taking

place as maintaining itself by adjustment to the oncoming event—the future. Every process can be resolved into a mere series of events which determine one another, if we regard them as past; but at the future edge of experience there is content which reaches out ready to accept the control of that which is taking place, in still maintaining itself. So far as I see, it is a datum of experience. It is more than life as life is defined by the chemist and biologist, but I know of no process that is not that of a living form. To identify that which is not found in life by the chemist or physicist with consciousness is to deny that life is a process, for the physicochemical statement reduces it to a causal series, and it becomes impossible to keep consciousness as a separate entity from swallowing up everything, unless one sets up an unmeaning parallelism at an arbitrary point in the causal series. It is this content that appears in the living individual, and with the new individual comes a new environment. The appearance of the process in this individual is of importance not only as essential to appearance of the lasting element in experience but also for the appearance of spaces and times and for the separation of space from time in extension. The permanent condition of conduct is an extension whose time system is determinate, and from which, therefore, the temporal character of extension may be abstracted, leaving the so-called spatial characters. The temporal extension that is abstracted from is indeterminate—time as exhibited in motion. The moving object is in a series of constantly changing successions, and in the environment of the individual it involves constantly changing attitudes in the individual.

Time which is indeterminate succession at the future edge of the duration, or specious present (what Bergson calls “living time”), is to be distinguished from what Bergson calls “spatialized time,” that is, a time that has been returned to an extension from which it has been abstracted, but returned as a still abstracted character. At the future edge of experience it is not time that passes but events that pass. It is because there are things that do not pass that there appears a time that

passes. In this time that passes the things last. Lasting things in a passing time is the situation arising from the return of passage to the conditions of conduct from which passage has been abstracted. At the future edge of experience things pass. Their characters change and they go to pieces. We may save the fragments and conceive of them as lasting physical elements, but at this perilous edge it is a world of flux. It is only the process that lasts. A process that lasts I have already defined as an event extending throughout a duration as a whole and merging into the future in adjustment to what occurs. Whitehead recognizes a merging from behind, in so far as "the two 'heres' of sense-awareness within neighboring durations may be indistinguishable. Namely, the sense of rest helps the integration of durations into a prolonged present."⁸ What distinguishes a process from a mere duration is that at the future edge of experience it merges with the emerging events in adjustment or control so that as a whole it is continuous with the future. What introduces the lasting character, as lasting, into experience is the inhibition within the process which exhibits the characters of the field of stimulation that are spatiotemporally distant. They are characters which answer to alternative responses when the individual has reached them. Their alternative character inhibits the act, but the adjustment has reference to the later situation, and between that and the here-present of the individual lies a response and a corresponding area which is unaffected by the ultimate form that the act takes. This field lasts with its objects while the adjustment takes place, and the organization of characters takes the form of, say, something to be jumped over, or something to be pushed aside. I have referred to the objects that in some sense define the intervening field. They also are physical objects that suggest different contact responses, but one's attitude toward them is not that of doing one thing or the other, but the balanced attitude of one who may react in different ways, while the locus of these varied responses in its spatial relation to the loci of other like objects

⁸ *The Concept of Nature*, p. 109

serves to build up the whole landscape which lasts between the here-present individual and the there-present object that is arising in the definition of the act. It is this inhibition in the process, owing to the problematic later stage of the act, that transfers the lasting character of the process to the intervening field at rest, i.e., a field that is organized with reference to an act or acts ready to go off when the solution of the problem is reached. The spatial organization of this field, from which the happening at the spatiotemporally distant spot is abstracted, is a timeless space that lasts. And passage in this field is an eventless passage. It is a time within which space and its objects last. Time is abstracted from this intervening field because the passage of events over there have no bearing upon it. Having been abstracted, it is returned to the field as a time within which it lasts.

It is evident that if the future edge of experience were immediately at the contact door, and there were no distance field of stimulation, or if the situation were that of an amoeba, or if conduct with reference to the spatiotemporally distant took place without inhibition, or if inhibition meant simply the abandonment of the initiated act and the commencement of another, there would be no time. There would be merely the passage of events, and the lasting character of the process would not be reflected either into the persistent here and there of the individual or into persistent physical objects.

Professor James stated that once in Paris he was wandering somewhat aimlessly through the streets and became suddenly aware that he was standing before the door of the *lycée* that he had attended as a boy years before. If we isolate the process by which he threaded the streets and reached this goal from the rest of Professor James's experience, it would have been an experience in which there was neither space nor time, but only the passage of event after event, spatiotemporally extended, but in which no building or street corner ahead waited while he reached it, in a time which had been abstracted from the passage. It is the later part of the process imbedded in the

whole and controlling it that is the occasion for the splitting of extension into space and time, and it can accomplish this only when alternative responses in this latter part arrest the process, leaving a persistent there and a passage abstracted from it.

The term "imbedded in the whole" calls for further elaboration. We are likely to conceive of this in terms of the central nervous system. There the co-ordinations which will innervate the manipulatory process are thought of as actually excited. If we placed upon the hands and arm delicate apparatus which could register minimal responses of their muscles, we might secure evidence of such excitement. This excitement may react back upon the conduct in reaching the object in question, controlling the advance upon it. The most favorable point from which to grasp the object may determine the direction of approach; and, if there are alternative responses of grasping the object, the interaction between these excited areas in the central nervous system may inhibit the advance until the conquest of the act by one or the other (or their organization into a more elaborate process) finally sets the advance free. I wish to detach the situation at the future edge of experience from this formulation in terms of past experience with its a posteriori implications, for the statement just given is one in which there is neither inhibition nor control, nor can there be an act or a process. What appears in the a posteriori formulation is nothing but ultimate physical particles in successive redistributions. The laws of these redistributions may be the basis for prophecy of the situation in a future situation, but this provides no future that is a part of the process until it has appeared as a past. The future that is there as a part of the process is that just taking place, in so far as it controls the whole process going on. The past projected into the future, hypothetically, is justified by the result, but the future into which it is projected is an extension of the future that is actually there in the act. The present is the combination of the future and the past in the process that is going on. The future is the control of the process, and the past

is that which is there as an irrevocable condition of the ongoing of the process. These two temporal phases, the future and the past, are divided between the individual and his environment, or the percipient event and the consentient cogredient set. The future comes in in terms of the act, the past in terms of the field of the act. Where they merge in the process, we have the present. In that minimal extension there is no distinction between the individual and the environment, but the control appears as selection in the environment with the inevitable isolation of what has been there that is appropriate for the demand of the act. In terms of the attitude of anticipation involved in control we have called the one consciousness. In terms of the condition of the act we have called the other the world. I find myself in agreement with Professor Bode in identifying the future with consciousness,⁹ though I have reached the position by a somewhat different path.

The existence in nature of this dependence of the cogredient consentient set upon the individual, which Whitehead's doctrine of relativity postulates, frees us both from the ascription of subjectivity to the future in the attitude of the individual and from that of the mechanical determination of the individual by the world. The world that is there, this slab of nature, is there because of the teleological determination of the individual. If we call it "experience," it is not a subjective experience of the individual. On the other hand, the causal structure of the set or environment that is selected in no way determines the selection that is made. As the future edge of experience we project the causal mechanism into the future, but always as the condition of the future that has been selected, not as the condition of the selection. The condition of the selection is always found in the process as a whole, whether this appears in the twisting of the plant toward the sun, or in the process that is responsible for foods, refuges, dangers, and the like. It is because it is a plant that there is twisting; otherwise there is simply a redis-

⁹ See Boyd H. Bode, "Consciousness and Psychology," in *Creative Intelligence*, Dewey *et al.* (New York, 1917), pp. 228-81, esp. pp. 242 ff.

tribution of energies which may be one thing in one environment or cogredient consentient set, and another in another. Given the environment of the plant, it is a twisting toward the greater illumination, and every change in it is necessitated when we look back at it. It is the life-process present throughout that makes it a twisting. In its utmost abstraction it appears as the cogredient consentient set. The cogredient set is at rest and endures (or rather the relation of here and there endures) throughout the duration; but, as we have seen, the mere successive appearance of a relation between the percipient event and the cogredient set, which becomes the same relation when it is taken as a whole, does not make this successive appearance of the relation the same if this added character of the whole is not there. It is the addition of the whole in terms of the act that is taking place within the field of rest that makes it a field of rest. From the standpoint of another percipient event it is not a field of rest but of motion, and, abstracting from any percipient event, it is neither rest nor motion but events extended spatiotemporally, with no determinate temporal direction, and consequently no determinate succession of one event upon another. If we grasp nature as made up of all these consentient sets, we must presuppose these processes (i.e., taken most abstractly, durations) which as wholes are present in all parts selecting the set that carries it on—what I think Whitehead implies in his expression of the best operative past. This appears in experience as the actual future, that is, the selection in the immediate experience of what expresses that which is going on, the act.

A point of crucial importance here is that the selection is responsible for an actual succession of events in nature which would not obtain if no selection were made or if another selection were made; but I am confident that no selection is conceivable without the appearance of a process which I have attempted to define in its highest abstraction as a spatiotemporal extension of events which is in some sense present in all its parts. Life seems to be the earliest illustration of this. Another

example of this, to which Whitehead is fond of referring, is a melody, though it stands on another level.

When and how the living process appeared can hardly be conjectured, though there is no reason to assume that it was not a gradual evolution which could be causally described in physical and chemical terms. Concerning how the form of the process which is ambiguously referred to as that of consciousness arose, we can gain more of an inkling. It must have arisen when distant stimuli governing immediate responses stretched out the future by their alternative possibilities. If a distant stimulus sets free simply an immediate response, there will be no more a future than that involved in its selection as the control of the process; but, if two or more stimuli open doors to varied responses, there appear, in the individual, the incipient acts that answer to them and, in the field, the organized groups of stimuli that mediate the different acts.

If the living form selects its own environment, as the percipient event selects its own time system and so its cogredient consentient set, it is giving rise to a field which but for its living process would not be there; and, if this selection is extended by alternative possible reactions at the future edge of experience, there is just so much more of the future brought into the act. I wish to contrast again the universe where its continuity breaks down in what Whitehead terms "atomicity" (composed of units characterized by inertia, electrical charge, by energy, together with their fields, spatiotemporally extended but with an indeterminate time dimension) with the universes, or slabs of nature, that arise with the life-process in its successive stages of development. Leaving to one side the question whether we can conceive of the universe as first spoken of as having existed in time (i.e., whether such a universe is more than a logical abstraction), it would be a universe in which there would be no consentient sets, no physical objects apart from the ultimate physical particles, no living forms with their environments. Scientific analysis, if it reaches the goal which it must at least contemplate, reduces the present worlds of experience or any

worlds of earlier experience to such a congery of ultimate physical particles and their fields and, under the doctrine of relativity, indeterminate as to their time dimension and thus subject to no determinate succession of events. But the worlds which together constitute the whole of nature are dependent for their existence upon the appearance of processes such as have been suggested. They always involve the interrelationship of individuals and their environments, whether it is that of the percipient event and its cogredient consentient set, or of living forms in their different stages of evolution and their richer environments. If we define as future that part of the experience in the temporarily extended duration which immediately, but not instantaneously, controls the ongoing process, enabling the whole to appear in continually new experience, then the situation in which the ongoing process is checked by the inhibition of conflicting tendencies (so that the act awaits not only a selection but also an organization of the field, answering to a temporal arrangement of the succeeding parts of the act) is an extension of the future. I have referred to it as the hypothetical future. It is, however, only an extension of what I may call the immediate future, or the actual in contrast to the hypothetical future. Its future character is found in the immediate experience, but in our ordinary use of the term we are likely to confine the future to this hypothetical phase, placing the immediate future in a wrongly conceived instantaneous present. Emphasis upon the future at once brings out the past. The past is that part of the experience that is there as the expression of the process, and which conditions its further expression as distinguished from its control. This is also extended hypothetically, but it retains its qualitative character of thereness and conditionality, so that two divergent pasts covering the same experience have the same functional character of thereness and conditionality, though they may be as hypothetical as the futures.

The thereness of the immediate and the hypothetical past is expressed in the term "datum," the given, the irrevocable from the standpoint of passage. It invites definition, since it is what

it is and cannot in itself be altered. And it invites analysis, since it is only that which is given, which has occurred, which is a whole equal to the sum of its parts. That which is going on is what it is in terms of a process that is constantly assuming new form and yet remains the same process. It must be taken as a whole, in what from the standpoint of the past is a part. Motion, until its path has been traced, that is, when it has ceased to be a motion, is what it is as a whole in any element of its trajectory. Mathematically we seek to express this whole that is in any of its parts by the law of the relation of the accomplished whole to its part, which is then identified with the motion, but this is a competent statement of the motion only when it is completed, or appears in the hypothetical future as a presented past. It belongs to the nature of the always contingent future that the motion may change direction or velocity through that which is emerging, so that its path may no longer express the law. I have a suspicion, which I have not verified, that the designation of an infinite whole as reflexive, i.e., as having a one to one relation with any of its parts, and therefore as in some sense substitutable for the part and the part for the whole, is another mathematical device for stating the process that is present in any instance and that belongs to the future edge of experience, in terms of the past in which the whole is the sum of its parts. In the case of inductive numbers we have by abstraction a noncontingent future. We can, therefore, stretch the counting indefinitely into a future which has lost its hypothetical character. The transfinite number, which is the number of the whole series of cardinal numbers, is not the number of any stretch of this series however extended it may be. It is an entirety, but the only unity that is there is that of the process. While this may be stated as the law of the heritability of all that is in n , and in $n + 1$, this conception of infinity goes farther and demands that we find in the part that is being counted elements that answer to the whole series. The infinite as that which extends indefinitely is captured as a whole in so far as it is realized that every possibly designated element in it must have a correlate in the stretch that comes within a specious

present. A process which may be extended into a noncontingent future is a series any part of which may be found in an expansion of the immediate process. It is already there in the sense that not only is any expansion of an equation implied in the equation—for this depends upon the substitutions which are made—but any portion of the infinite series is actually realizable in the immediate experience. The movement toward the infinitely small seems to provide a field for a statement, in terms of the past, of what is characteristic of the process—namely, that it is present as a whole in any of its extended expressions. Any such statement, however, is in terms of the past. It does not cover the process as future, for the future is incurably contingent. It has only the function which the past has in conduct, that of providing the condition that is there for the further expression of the process.

This function of the past, that of providing that which is there as condition for future conduct (expressed by Whitehead in his statement: "A percipient event selects that duration with which the operative past of the event is practically cogredient within the limits of the exactitude of observation"), is fulfilled by the hypothetical futures of distant physical objects in the perceptual world. Each such object is the stimulus or occasion for a certain number of contact responses which inhibit one another, place the individual in the balanced attitude of readiness to use the object in many ways, and answer to what the object is in experience. But none of these responses is within the reach of immediate experience. There is a common element in all these possible future acts: that of getting to or away from or moving with reference to the object. Taken together a group of such objects with these distance values constitute the field of action. It is a field of action, and the whole field is oriented with reference to that stimulus which sets the response free, but in the presence of alternative distance responses there is inhibition, and during this inhibition this field which is not involved in the alternative distance reactions lasts.

If we now transfer attention from the psychological field of a living form that is capable of breaking the physiological act

by manipulation, that orients itself with reference to distant objects, and in the case of alternative manipulatory responses to the distant object, that inhibits the identical movement toward the distant object, over to the field of the environment of the form, the form lies in the world of physical objects and, ultimately, in that of scientific objects. As long as we keep within the categories of the biological sciences, the strict dependence of the environment upon the form can be readily recognized. No environment exists for the form except that to which in one way or another the form can react. This environment may be generalized as that of the species, but this is possible only under a corresponding generalization of the form. If, however, we step back of this biological category to that of the physical object, which we can define first in terms of generalized manipulatory experience and then in terms of the object of the physical sciences, there are two aspects of this world in which it seems to lose all determination by the living individual. One of these is that of the unity and organization of this world and its objects, and the other is that of the content of the object, especially of the scientific object.

The most summary fashion of presenting this loss of determination of the world by the individual is in the historical account of a world within which the living forms have arisen, and which by presupposition must be independent of the forms themselves. Whatever may be said of the sensuous characters and functional contents of objects in the environments of living individuals, the world that existed before them and out of which they emerged must, it seems, be open to a description that is entirely independent of any relation to the life-process and the forms in which it has been embodied. Over against this common-sense and logical presupposition stands in startling contrast the presupposition of relativistic doctrine that the selection of any consentient set is dependent upon a percipient individual, and this presupposition stands at the farthest remove of scientific presentation of the world. At least logically it antedates the appearance of any world and its objects.

The problem thus indicated Whitehead meets by the assump-

tion of the existence in nature of an indefinite number of time systems. While the percipient event selects the time system that is cogredient with its operative past, the time system is there for selection, that is, different orders of the succession of events are there in nature. I have suggested the illustration of the revolution of the heavens about the earth or the alternative succession of the rotation of the earth upon its own axis. Any particular event involved is in either time system, or order of succession, and there is at least so much of an organization of these different time systems in nature that the statement of a coincidence of events, such as an eclipse, in one time system may be translated into the statement in another time system for the coincidence of the same events. Each time system represents a complete slab of nature, the whole universe from one standpoint, and the whole of nature is the sum of all these. There seems to be further indication of organization of these time systems in that there are successions of events in what we term a past and a future which must obtain in any time system, while there is a realm of succession in which what is contemporaneous in one system is not contemporaneous in another. I have hazarded, I presume incorrectly, the analogy of the distortions of spatial perspectives in, say, curved mirrors. However incongruous these distortions may be, they are all translatable into one another, and there are limits beyond which these distortions may not go. So there are temporal perspectives, translatable into one another, and confined within limits beyond which it seems to us their distortions may not go. We can, then, reach back into the history of the world and read it with equal legitimacy in Ptolemaic or in Copernican terms, for each of these time systems was there, but the operative past of a contemporary of Ptolemy would counsel the selection of the succession of the rising of the sun to the going-down thereof, instead of the time system of Aristarchus, Copernicus' representative in Greek astronomy.

It is Whitehead's attitude toward the second aspect, the implied independence of the content of the object, i.e., its independence of the individual, which seems to me to present a

serious difficulty not only in itself but also to Whitehead's view of the independent presence in nature of different time systems. That attitude I have already presented. It is that objects in nature which are ingredient in its events do not pass with the events. This tenet of Whitehead seems to be a simple datum of experience. Now that we realize that the spatial aspects of the Great Pyramid lie within the passage of nature, we are face to face with the fact that it is the same pyramid that has been there since its construction. Evidently the pyramid as an object does not pass. And this is true not only of the pyramid as an object or terminus of thought; it is true also of the terminus of sense awareness. It is the same color that we view during the passing moments while we contemplate a painting. The spatial dimensions have passed, though their organization for our thought persists, but the color persists.

I have undertaken to show that, so far at least as the sensuous characters of events are concerned, this is not the only interpretation that can be given of experience. If we assume that sentience passes with nature there is no reason for assuming that the color has not passed also. This is, of course, a rejection of Whitehead's doctrine that the existence for us of the color is due to a cognitive relation, an awareness. I am maintaining the pragmatic doctrine that the sensuous characters emerge with the sentience of the form and that cognition represents a later phase of behavior and that it is due to this phase of behavior that the lasting characters enter. At least I am attempting to show that this is a possible interpretation of nature as a passage of events, even in its spatial dimensions. And it is not simply out of consistency with pragmatic doctrine that I am presenting this possibility, for it appears to me not only that the immediate findings of experience are that colors and objects do pass but also that scientific analysis, in retreating, as it is forced to retreat, to ultimate physical particles as its objects, loses also its time systems and the consentient sets and their organization together with the objects that can arise in them.

XXI

THE PROCESS OF MIND IN NATURE

A. THE EFFECT OF MODERN PHYSICAL SCIENCE ON THE CONCEPT OF MIND

THREE logically disparate factors have largely influenced the conception of mind entertained since the period of the Renaissance: the bifurcation of nature, the relation of the object of experience to the experiencing individual, and the location of contents in experience which have no definite place in an abstract physical environment.

The conception of nature which was introduced by Galileo, through his doctrine of dynamics, reduced it to a statement of matter in motion. Matter was conceived of as that which effectively occupies space, i.e., resists the tendency of anything else to occupy the place which is occupied by the body in question; possesses inertia, i.e., the tendency to remain in the state of rest or motion in which it is found; has mass, i.e., has a quantity which can be measured, given equal density with other things with which it is compared, by the amount of space occupied; and has mobility, i.e., the ability to pass from one place to another provided its inertia is overcome. There were, of course, other characters of matter which had to be recognized, notably the characters of chemical substances, heat, and those of electricity. Heat was resolved into motion of the physical particles of which the objects of experience are made up. The electrodynamic theory of matter undertakes to state chemical characters in terms of the changes which result from the structure of so-called chemical substances out of the two sorts of electrical particles, positive and negative, which it assumes are the ultimate constituents of matter. If nature is ultimately made up of positive and negative particles of electricity which possess mass

and inertia, the only other character which it has, apart from the aggregations of these particles and their motions, is that of the differences of the positive and negative particles, which can be stated in terms of mass, volume, and motion.

The more or less tacit acceptance of this doctrine that the reality of material nature can be reduced to terms of extended matter in motion carries with it the implication that these characters of nature which are not those of the effective occupation of space, motion, and the results of these, such as momentum, and in general what are called expressions of energy, do not reside in nature. Color, sound, temperature as felt, odor, taste, as well as all the affective characters of things, could not reside in nature in its reality. The simplest treatment of such characters was to place them in mind, as the effects on mind of the action of a nature which was nothing but matter in motion.

The organism that mediates between nature and mind is itself a natural object and must, therefore, on this conception be stated in terms of matter in motion. The study of it in its mediation between nature and mind can show the natural processes which go on within it when these characters of things, which must be regarded as mental, arise. Thus there arose a physiological psychology. It found itself with a further task upon its hands. These so-called secondary qualities of things could not be separated from the primary qualities, i.e., those answering to the real characters of natural objects (effective occupation of space, mass, inertia, and motion), at least in so far as our perception of them was concerned. The same sort of a biologic process goes on in our perception of things as extended and inert and moving that goes on in our perception of things as colored and sounding. If color and sound were mental, why should not extension, inertia, mass, and motion be mental? And Berkeley drew the logical conclusion that nature in all its characters is mental. Hume pointed out that, while we might be forced into taking this position by logical procedure from the premises from which we started, we could not preserve this belief the moment we stopped philosophizing; and science con-

tinued to pursue its account of nature unperturbed by the difficulties which its generally accepted doctrines had upon the theory of mind.

What I wish to point out is that the theory of mind found itself obliged to make a place for contents which, for immediate experience, belong as definitely to the outer object as those characters which science conceives to be the nature of the things that are entirely independent of mind.

The mechanical theory of nature which has dominated modern science seems bound to state the relations of minds to matter and of matter to minds in terms of mechanical processes which by their nature leave no place for mind and so-called mental processes. As all mechanical processes can be exhaustively stated in terms of matter in motion, there is no place in its equations for the so-called states of consciousness which became necessary to state the contents of the secondary qualities of things—the effects which objects have upon the mind through the medium of the organism, the imagery which could not be stated in terms of matter and motion, together with the affective characters of things. The logical account of such a situation appeared in a parallelism which assumed conscious states accompanying certain material conditions of the nervous system regarded as a part of a mechanical whole. These conscious states could have no place in the mechanical description of nature. The connections between minds and things became simply that of the simultaneous appearance of certain physical particles in motion and certain conscious states, the former being the conditions for the appearance of the latter. One of the results of this conception has been to translate all conscious activity into states of consciousness which merely accompany the nervous phases of motions in the body. In general, the connections between the experiencing individual and the things experienced—conceived in their physical reality—were reduced to a passive conditioning of states of consciousness by a mechanical nature.

Into such a mind was carried, as previously indicated, whatever in nature could not be stated in terms of matter in motion.

This included not simply the so-called secondary qualities but also the whole content of imagery which goes so largely into our perceptual objects, and especially all the aesthetic and other emotional and affective characters of things. The result of this was to force upon the mind the presentation of the world of actual experience with all its characters, except, perhaps, the so-called primary characters of things. Mind had, therefore, a representational world that was supposed to answer to the physical world, and the connection between this world and the physical world remained a mystery.

B. PRAGMATIC REACTIONS TO A SCIENTIFICALLY
INSPIRED DUALISM

The unsatisfactory result of this division of nature between mind and the physical universe led to the objective idealistic systems in which nature was taken entirely into mind not as the representation of an actual or possible reality outside of mind but as the sum total of reality, the subject-object relation existing not between mind and what lies outside of mind but between different phases of the spiritual process of reality. The undertaking failed, for one reason, because it identified the process of reality with cognition, while experience shows that the reality which cognition seeks lies outside of cognition, was there before cognition arose, and exists in independence of cognition after knowledge has been attained.

Two modern trends of thought have appeared seeking to recognize the independence of nature over against cognition and, at the same time, to return to nature the content which had been placed in mind. Realism has reduced cognition to an awareness by mind of all the aspects of nature, asserting that all of these—secondary qualities as well as the primary qualities—simply enter into mind and depart from it without being affected by the contact. The other trend, that of pragmatism, regards cognition as simply a phase of conduct, denying any awareness to immediate experience. It is the relation of mind to body from the standpoint of pragmatism that I wish to consider.

Two pragmatic doctrines have definite bearing on the relation of mind and body. These are (*a*) that the so-called percept in immediate experience is the object, there being no mental state of awareness answering to the object, and (*b*) that reflection, including cognition and thought, is a phase of conduct within which conflicts between reactions are met by reorganization of the environment and of the tendencies within the organism to respond to it—the validity of the reorganization, and therefore of the object of reflection, being tested by the success of the reconstruction. It follows from these doctrines that in immediate experience there is no mind, in the sense of reflection, the relation that answers to that between mind and body being that between a social animal and its environment.

This relation will lie between things in the environment (or the environment as a whole of which the things are constituent parts) and the individual as another thing. The dividing-line between the environment and the individual in immediate experience is functional. The individual acts, and that upon which and within which he acts is the environment. The hair that he has cut, the tooth that he has pulled, and the foot that he bathes belong to the environment. The organism that effects these processes is the individual. The contents of the things in the environment are their colors, sounds, tactual qualities, odors, and tastes, their beauty or ugliness, their meanings and values, including characters of past and anticipated experience that go to make up the object. The content of the individual in immediate experience seems to shrink to the efforts and strains involved in attention, postures, and movements of the body, with such boundaries as actual or anticipated contacts define. This statement has reference to what are called physical things, as distinguished from social things. The social environment is a narrower one than the physical environment. The physical environment also includes the social environment, that is, social things are also physical things. But persons, or selves, are things in our immediate experience, and the individual in that social environment of things is himself a person, or, better, a

self. The same distinction between things in the environment and the individual holds here that holds between the physical things and the physical individual in whose environment they lie. This amounts to saying that social objects, or persons, are immediately present in experience, or, in customary psychological language, are perceived. The social individual or self exists in his efforts and tensions in social conduct toward the social individuals that have all the characters that belong to them as neighbors, members of families, or other groups. They have besides these characters those of physical beings. The boundaries of social things and of the individual as a social being are determined by contacts in social conduct. Social conduct presupposes a group of animals whose life-processes are determined in considerable part by the actions and the consequences of these actions on the part of one another. These actions called out by the peculiar characters, postures, and gestures of the different members of the group constitute social conduct. It is important to note that in immediate experience the environment and the things within it extend both spatially and temporally, that things are therefore at distances from one another, that they change qualitatively and move, and that these relations of extension in immediate experience are always with reference to the here and the now of the individual that answers to the particular environment. Things exist immediately at a distance, and they occur immediately before and after one another. Spatiotemporal intervals are judged and criticized in reflective experience, but, in order that they may be judged, they must exist immediately and in the organization centered about the here and now of the individual implied in the experience.

The other characters of things besides those of extension, those in psychological terminology termed sensuous, and the meanings and other values, are subject also to the organization of environment and individual. In immediate experience the import of this determining nature of the relation between environment and the individual appears in the differences in all the foregoing fields which results from the different positions,

sensings, and acts of attention of the individual. The individual opens his eyes, changes his position, and directs his attention, so that the characters of things may become different. Furthermore, the meanings and other values of things are relative to the particular act in which in immediate experience the individual exists as an agent. The action of the individual in all the fields of so-called experience is selective. The contents of things in immediate experience are in a considerable degree dependent upon the individual as acting, as an agent. In this sense the environment of the individual is relative to the individual. If an individual sees two objects where there should be one, or the reflection of an object in a mirror, or a circular object as an ellipse, or a straight stick in water as bent, he may turn his head, or move to another position, or move the object so as to see the object as it is; but he feels no inclination to place the double objects, the reflection, the elliptical coin, or the bent stick, in himself, except in so far as the inclination may be logical, owing to a reflective philosophical attitude. In immediate experience these so-called illusory aspects of things are in the environment. In most cases they are adequate stimuli to normal conduct. They are so genuinely in the environment that, if we undertake for doctrinal reasons to place them in a consciousness, we find that they take the whole environment with them. We are not disturbed by having two distinguishable visual images occupy the same place at the same time in inadequately focused binocular vision. The afterimage, or aftervision, of a bright object may be placed at different places in the environment, and we may thus vary its dimensions. We are in the same domain of perceptual experience when we recognize the content of memory imagery in the object. We see on the printed page words, light from which never reaches the retina. We see the face of an acquaintance, only to discover that a so-called image has filled out the indistinct vision of another person. We see things hard and cold and smooth and succulent, and there are sensuous contents present that bear the same immediate relation to the individual as do those of vision. When we recall the tenuous im-

ages of a past vivid experience, these images are out there somewhere in the environment, in no way disturbing the vision of things we say to be actually there. In dreams such images occupy the whole field of immediate experience, and in hallucinations they compete with other experiences for what we call reality.

C. THE ACT IN RELATION TO DISTANCE AND CONTACT EXPERIENCES

Our primary adjustment to an environment lies in the act which determines the relation between the individual and the environment. An act is an ongoing event that consists of stimulation and response and the results of the response. Back of these lie the attitudes and impulses of the individual which are responsible for his sensitiveness to the particular stimulus and for the adequacy of the response. It is the adequacy of the response which in immediate experience determines the reality of the stimulation. Things are not real as seen or heard or smelled; they are real as actually or potentially experienced through contact.

In immediate experience events are present in a temporal as well as a spatial thickness. The psychological term for this temporal thickness is the specious present, and this involves an actual duration of things in which, to use Whitehead's expression, an event extends over other events that make it up. A reflective analysis of this duration breaks it up into instants without temporal thickness that have no relation except that of succession. A group of such instantaneous events can have no inner durational connection with one another, such as that of whole and parts, since each event has ceased to exist before the next arises. We replace in reflection the actual wholeness of durational experience in two ways: either by a thought-conspectus of the succession of instantaneous events or by the conception of a persistent force which finds expression in the events. The conspectus reveals uniformities of change, which become the scientific content of the concept of force. The reflective judgments

that belong to such a scientific procedure are on a different logical level from judgments of perception, though the term "judgment" in immediate experience is probably a misnomer. There is, however, in immediate experience, with its actual durational connection of stimulation and response, a fulfilment of the former by the latter that I take to be the basis for the reflective judgments of reality. The response is functionally the reality of the stimulation; the end of the act the reality of its beginning. The stimulation implies the response. The fundamental expression of this is found in the location of the reality of the distance experience in contact experience. The completion of any act called out by a distant object would, if all its tendencies were carried out, eventuate in contact objects.

The contacts which are the realities of distant experience are, however, the means for further action, either in the completion of fundamental biologic acts, such as that of eating, or in the mediation of more complex acts. Contacts in immediate experience are in themselves never ultimates. If we set them up in a mechanical science as the reality of the world, we must remember that in conduct they always look beyond themselves to further conduct.

Recurring to the values of the different elements in the perceptual object, it is to be noted that distance stimulation has in it the promise of later experience that justifies or validates it. This later actual or imaged experience is of the same nature as that of the contacts which we are immediately experiencing, in which the distance characters disappear. The world of reality that we assume to be existing at any one moment of experience is, then, of a contact character—things that could be handled, or the divisions of these contact objects which science sets up as its hypotheses. In so far as our judgments of perceptions and those of reflection place these contact contents in the objects, they have necessarily removed their distance characters, for the contact character implies that the distance has been surmounted and that the result of the act has substituted the realities of contact for the beginnings of the act. It is true that we

can generally see what we feel, but the sight is only an invitation to manipulation. However, this vision of the object that we at the same time manipulate is of fundamental importance. It is the maximum vision toward which all visions of the object expand as it approaches us or we approach it, and is that visual content which does not perceptibly vary in the perceptual field. Even this visual content varies as we permit the eyes to approach or withdraw from the object, but within the field of manipulation the import of these variations disappears because we can always identify the seen thing with the dimensions of the felt thing. Having made this identification, we proceed to use the richer content of visual experience to identify the same object in different positions, and the finer discriminations of vision for the higher degrees of exactness in measurement. The processes of so-called exact measurement are indirect and depend upon the probabilities of variation, but back of them lies the assumption of an application in actual or imagined contact experience of some sort of a unit measure. This contact extensional experience remains the same wherever we are, while visual experience varies with every change of position. The uniform space of a measureable world is, therefore, a contact space.

It is further evident that such a uniform space must also be a timeless space, for we assume the completion of all the acts which perception implies, and, if they are all completed, the time which their normal carrying-out would involve must be annihilated. A uniform space can be obtained only by the sacrifice of time. But time does exist. What has been termed "judgment of perception" (the implication that a contact experience does or will validate the distance stimulation) does not in immediate experience remove the distance—say, visual—character of the object from the realm of existence, or even substitute the contact character, which validates it, for the distance content. The colored, sounding, odorous world is there. The individual, apart from the effort involved in reaction, seems to be represented by the "here" and the "now," and by the control which he exercises over the contents of the environment through

selective attention. This orientation and selective attention are, however, but phases of the act. There is nothing in this nature of the individual which suggests transferring any of these characters of an environment which is there at a distance to the individual. The fact that what is felt is not, as felt, colored or sounding, does not suggest that color and sound are not in the object as it exists at a distance, though the ultimate contact experience is the justification for the action which they call out—for their being, in other words, distant objects. Nor is there any problem in the relation of the distant stimulations to the individual in immediate experience. What is later interpreted as an epistemological problem appears here simply in getting adequate stimulation and in hesitancy to response in the presence of different stimuli. Nor is there any suggestion in the success or failure of the act that what are later termed the logical and affective values of the objects can be transferred to the individual. There is at this stage in conduct no problem of mind and body. So far as the self exists at this stage, it is a part of the environment like the body, or it is the active individual in social responses.

D. THE FUNCTION OF THE SELF IN CONDUCT

The essential condition for the appearance of what has been conceived of as mind is that the individual in acting with reference to the environment should, as part of that action, be acting with reference to himself, so that his action would include himself as an object. This does not mean that the individual should simply act with reference to parts of his organism, even when that action is social, but it does mean that the whole action toward the object upon which attention is centered includes as a part of this action a reaction toward the individual himself. If this is attained, the self as an object becomes a part of the acting individual, i e., the individual has attained what is called self-consciousness—a self-consciousness that accompanies his conduct, or may accompany a portion of his conduct.

There are two things to point out here: one is the function of

making the individual himself an object in his own act; the other is the mechanism of this conduct.

The making of an individual an object to himself is not found in immediate experience. In immediate experience the introduction of one's self into the act is hampering and embarrassing. In conduct within which readjustment must take place before the act is completed, there is at least a place for such an involution as that of making one's self an object in acting with reference to the environment. Given such a situation, in which because of conflict, readjustment must take place, the function of making one's self an object seems to lie entirely in so pointing out to one's self the different characters of things that a readjustment of responses will become possible. Control in intelligent conduct takes place through attentive selection of stimulations. There is no direct control of the response. Control is secured through the finding and emphasizing of the appropriate stimuli in their relation to one another. Selective attention may be given to different features of the objective field, without the individual pointing them out to himself. Under these conditions a readjustment may take place without what we term "reflection." This is the solution of problems by trial and error.

In the trial-and-error solution studied in the experimentation on animals, we find that a number of trials with failure are necessary to inhibit the wrong response, while the intelligent human individual does not simply repeat the response that has failed. In the experience of the lower animal the memory image of the failure does not arise to inhibit the response until repeated failures have taken place. The human individual in indicating himself as carrying out an act provides a suitable content for the attachment of the memory image. This is to be recognized not only in experimentation upon animals but also in our own conduct. There is a considerable field of our conduct where we also proceed by trial and error. This is true in the acquirement of a great deal of our manual skill in games, or in the control of such mechanisms as the bicycle or musical instruments. We gain the control after repeated failures which we can correct only grad-

ually. What appears upon analysis of this conduct is that the individual cannot indicate to himself exactly what he is doing, or, what is the same thing, exactly to what stimulus he is responding. He does not present himself as responding to a specific stimulus in a definite fashion. The identification of the self with a certain act serves to isolate it and render it definite, so that the results of past experience enter into it to control its further expression. In the situation noted above, in which one acquires manual skill by the trial-and-error process, what is experienced is that one cannot tell what one has done that has been responsible for one's failure. The individual is unable to identify himself with a specific response. He repeats the same inept motions until gradually he finds himself adjusting himself to the field of stimulation, responding to characters that he has not noted, but still without being able to identify himself with a specific response or to determine just what it is to which he responds in his successful acts. But where stimulus and response define each other clearly, as in leaping over a ditch, or in pounding with a hammer, there he can indicate to himself the stimulus, the self to which it is indicated appearing in the tendency to leap or strike. If the tendency is for the moment inhibited, the results of past experience arise, and he finds himself noting to himself elements in the object which were present in the earlier experience, at the same time identifying himself with the varied response, or tendency to respond, which these characters call out, saying, "I cannot jump it," or "The hammer is out of my reach." The effect of this is not simply to leave the individual in an attitude of defeat over against a forbidding environment as a whole, but with a specific object (an unjumpable ditch, a hammer out of reach) while the rest of the environment is freed from this atmosphere of defeat and is ready to call out other reactions. There is a further result, namely, that the ongoing process of advance to a distant goal (such as driving the nail) is present as a self that is seeking to advance in some other way than by direct progress, that is seeking to drive

the nail by some other method than by an immediate seizing of the hammer.

The general result is that other tendencies to action are freed to sensitize us to additional stimulations. The psychological elements of an object are a definite stimulation answering to a definite response plus the results of past experience of the response. The object is a collapsed act. It is when these results of past experience have attached themselves to the stimulations that we find a field of objects within which we can act intelligently. The conflict, together with its inhibition, breaks up these objects, and it is not until new objects have arisen that intelligent conduct can proceed. What is essential to this reconstruction is such an analysis of a complex act that that which has checked the whole act may be identified with the specific part of the act to which it belongs, for it is only when a definite tendency to respond answers to a stimulation that it becomes a distinct part of the field of perception and can assimilate the memory images of past experience. To isolate a part of a complex act is, then, to expose the field to the independent sensitizing influence of the other tendencies which were so organized that they acted under the conditions set by the whole act. The immediate function of the appearance of the self in experience is that of analyzing the complex response, in the face of conflict, so that a new field of objects may appear together with a reconstructed act. This takes place through the identification of the self with the defeated element of the act, and then with the entire act, deprived of this element, seeking to reorganize itself out of elements freed from the former organization, sensitizing us to characters in the field of stimulation to which we would otherwise not have responded, that is, which would not otherwise have existed as objects for us in the environment.

The further function of the self as an object in the field of action is to be found in the attention to the universal character of the object in the environment, and its abstraction by means of symbols of communication in the form of what is called ideas.

Whatever endures in the midst of the passing of events (whether this be some sensuous content that persists while other characters come and go, or a structure of the thing that admits of change of content, or an aesthetic, logical, or ethical content that persists while other characters shift) is in so far universal, for it is a character of which there are a number of instances and of which there might be an indefinite number. Within the structure of the thing these universals may also disappear while the structure remains, since there may be what are called more inclusive and less inclusive universals. It is these persistent characters which can be indicated to others or to one's self, for only that which persists can be indicated. That which is indicated must last while attention is held upon it and directed toward it. Such an indication of a character by a specific social gesture, generally vocal, with the tendency to respond to the character pointed out, is what is called an idea that answers to the universal content. It is the attitude of response to these universal characters which answers to them in the individual. The responses are universal because they may be called out by any number of different stimuli and so answer to that universal character in the object which calls them out. In the experience of individuals they are the criteria by which we identify the universal characters in things. Whatever one tends to sit down in is a chair. Whatever one places in a scale of colors is a certain blue. We identify the universal contents in things by presenting ourselves as responding to them, and we call these responses aroused by the significant symbols of social gestures, or language, the meanings of things. It is because we can summon ourselves, as organizations of responses, into the field of experience by means of these symbols, that we are able to isolate these meanings and so further the reorganization of our responses in a plan of action.

The mechanism of bringing the self as an object into the field of experience implies two things: first, that the individual indicates things and their characters to others, and second, that the stimulus of which he makes use is one to which he tends to

respond in the same fashion as that in which the others respond. Such stimuli are found chiefly among the vocal gestures, which thus become language symbols, significant symbols. Back of this developed process of speech lies that long process in infancy of stimulating one's self by one's own social conduct and attitudes to play the parts which one's conduct and attitudes call out in those about one. It is a process which has passed under the misnomer of imitation. It leads through play to the building-up of these responses in the roles of others into a self or personality. In this part of the self the child indicates to himself what he wants and can discuss with himself things and actions from the varied standpoints which these different responses represent. Thus in the experience of the individual a self has arisen to serve the functions of reflectively attaching to things and their characters the results of past experience and of indicating and isolating the meanings of things.

E. THE NATURE OF MENTAL PROCESSES

It is evident that the mental processes are just those phases of conduct into which the self as an object has come to deepen and render significant our analysis and to make possible the rational solution of our problems. So far as the significant symbols which the individual uses are stimuli to his own responses, these processes lie in the individual. So far as things, characters, and imagery are indicated, the processes extend beyond the individual. The locus of mind is not in the individual. Mental processes are fragments of the complex conduct of the individual in and on his environment. The objects and contents of the objects are as much in the environment in the reflective processes as in those of immediate experience. What has taken place in the reflective phase of human experience is this: the actual dependence of the environment upon the individual, which is not present in immediate experience but which has always existed in the relations of living forms to their environments, has, through the appearance in experience of the self as an object, passed into the control which the individual exercises over the

environment. We have referred to two phases of this control. One of these is the appearance of new objects through the reference of failures in response to the specific stimulations that call out the response. The double reference of past experiences of the act to the objects and to the self puts at the disposal of the individual results of responses in their relation to what called them out but do not, or may not, immediately appear. We express this in the term "recollection," meaning by this that we summon and control memory imagery, both in the analysis of the object and the complex response to the object, through its place in the self extending into the past from the "specious present." The second phase is found in the appearance of responses which had belonged to complex acts, but which in the inhibition of the act can answer to the new objects appearing in the environment. These responses constitute, as we have seen, the meaning of these objects when they have been indicated by the significant symbols of social conduct and are called ideas. It will be seen that, while an indefinite number of instances of objects in nature appear in our immediate experience, new objects arise in reflective experience only through the interaction of the individual and the environment by means of the mediation of the self as an object.

There is another phase of mental processes which has been barely indicated above, but which calls for further reference. This is the unity of the analyzed or diversified field of the environment, and of the responses that inhibition has set free from the organization of the earlier act. What is preserved is the wider organization of the life-process within which the inhibited act lay. One way of expressing this is to say that the environment exists for the individual as that within which the more inclusive act must go on, as containing the conditions for any solution of the problem which arises out of the conflict. The unity of the environment is that of organization of the conditions for the solution of the problem. The problem itself exists within the larger inclusive activity which must go on in some different form, under some reorganization of the parts of the

act in the presence of the conditions which appear in the environment. This unity appears in experience through and in the self as an object. In an experience within which individual and environment mutually determine each other, the unity of the environment and of its constituent objects as well as that of the individual arises out of the activity of the individual. In so far as the individual acts with himself as an object, this organization of the environment and its objects in terms of the conditions of the solution of the problem, and the larger act within which the inhibited process lies, make the problem itself an object for the individual. In customary phraseology we say the individual knows what he is trying to do and what are the conditions of his doing it.

A further question arises in regard to this reflexive intelligent conduct concerning the fashion in which the self as an object becomes a part of the individual. In the play period of little children this reflexive act has not yet taken place. The child in one role addresses himself naively in another role. These roles are not at first organized into a personality, the child simply passing from the one into the other as the conduct in one calls out a response in the other. In more consecutive play, especially of two or more children, the tendency to take other parts comes in to stimulate and control the execution of the part assumed. Thus a child will stop and applaud himself and then resume his performance. If the play becomes a consecutive whole, the tendency to take all the parts at the appropriate moments is present in the attitude of the individual child, controlling his entire conduct. The child becomes a generalized actor-manager, directing, applauding, and criticizing his own roles as well as those of others.

It is the attainment of this degree of personality which marks the passage from the period of play to that of games. The nature of the game is such that every act in the game is determined and qualified by all the other acts. This is expressed by the rules of the game, and implies in each individual a generalized player that is present in every part that is taken. What takes place in this dramatic fashion in children's plays and games evi-

dently goes on in the formation of the child's personality in the life of the family, and of other groups in which the child finds himself. Through assuming the roles of others, to which he has stimulated himself by his own conduct, he is organizing them into generalized attitudes and becomes a member of the family, of the school, and of his set. I have already indicated the capital part which language plays in this process, owing to the fact that in the use of the vocal gesture the individual tends to arouse in himself the same response as that which he calls out in others. In a word, the self as an object becomes a part of the individual through his having assumed the generalized attitude of a member of the group to which that self belongs, a group that widens until it takes in all rational individuals, that is, all individuals who could indicate to one another universal characters and objects in co-operative activity. In being an object to himself in this role of a citizen of the universe of discourse, a person indicates to himself both the conditions of the solution of his problem and the various inhibited responses that are seeking reorganization, and associates with these responses the results which they have had in past conduct, thus giving rise to the new objects which provide the field for the new act.

If we ask what actually takes place in the experience of an individual during mental activity, that is, in reflection in the presence of a conflict and its consequent problem, we discover the following situation. The individual in the attitude of a member of a rational group indicates the various characters of the new objects that have arisen as the result of the conflict, and the consequent inhibition of the complex response that was going on, by means of significant symbols. These indications are gestures—mainly vocal gestures—which call attention to these characters in things. It is important to note that the reason these characters excite attention is that there are reactions which they call out. The reactions are those which are in some sense set free by the inhibition of the original act within which they were organized. The original form in which these gestures appear is in the adjustment of the individual to the responses which are ready to take place. In social forms these gestures

have become valuable stimulations to other members of the group, such as a herd or a brood of chickens, and have been preserved. In the human individual that tends to take the part of the other, they have the double significance of directing his own attention and of exciting the attitude of the other. In the attitude of the other the individual not only tends to respond to the stimulations but to indicate the response which he tends to make by another significant symbol. There are now two roles, at least, involved in this conversation, that of the generalized actor whose attitude represents an adjustment to all the alternative responses which fall within the larger act within which the conflict has arisen, and that of the specialized actor who tends to carry out the response to the stimulation upon which the attention is directed. To recur to the illustration already used, the inhibition of the act of continued walking toward the distant goal sets free the possible responses to stimuli to jump the ditch, or to skirt or bridge it. But they all lie within a generalized process of locomotion, and this generalized process in some sense presents conditions for the selection of one alternative rather than another, or for some combination of them. The specialized actor indicates the response, say, of skirting the ditch, but it is indicated to the generalized actor who represents its relation to reaching the goal. Passing from one role to the other, through the use of the significant symbols, the individual relates this specific response as well as others to the including act. Eventually the specific response or set of such responses falls into place within the larger act, and the individual proceeds.

F. IMAGES, IDEAS, AND SECONDARY QUALITIES

In the mental processes there are two sets of objects which have in especial degree seemed to demand a mind to act as a habitat. One of these sets is that of imagery. The mind becomes

The mansion of all beauteous forms;
The memory is as a dwelling place
Of all sweet sounds and harmonies.

The other set of objects is that of ideas. The very nature of the idea indicates that in a very real sense it is not in the world. One's undertaking is that of fashioning the world so that it shall conform to an idea that is not there realized, and that reconstructed world is an environment that is confined, at least for the time being, to the individual whose idea it is. This holds also of imagery. As content we assume that imagery belongs to an environment that is confined to the individual in question. In that sense it is a private environment. It is a piece of the world into which no one else can enter.

It is, however, an unwarranted assumption that such contents are so substantially different from objects in the common world of experience that they cannot belong to it. As already indicated, a content of imagery is normally found in the objects of the world of immediate experience, and the ideas as contents appear in perceived things as their natures. It is not some substantial character that differentiates images and ideas from the world about; it is their accessibility. In dreams and hallucinations this inaccessibility as a character has for a time disappeared, and the contents are no longer the stuff that dreams are made of. Nor is inaccessibility confined to images and ideas. Any part of the organism except in so far as it is located in distance experience as a part of the environment—I refer to such objects as an aching tooth or a pleased palate—is also inaccessible to all except the individual whose organism it is. The inaccessibility in this latter case is plainly mechanical. If the world at large had nervous access to the tooth such as is accorded to the suffering individual, it would be an aching tooth to all. I see no reason to assume that, if a similar neural access to cerebral tracts were possible, we might not share with others identical memory-imagery. This view that the nervous system provides private access to certain realities has already been suggested by Bergson, in his *Matière et mémoire*. But Bergson did not conceive of the image as the physiological stimulus, as the table is conceived when we speak of it as the physiological stimulus in the experience of the table as an object. He thought of

the brain as a selective agent for picking out the images which are needed in our conduct, but he gave no clear picture of the mechanism by which this was accomplished. The best picture of this which a physiological psychology has been able to present has been that of the re-establishment of a sensuous experience when the nervous centers which were involved in this experience are centrally excited. It is possible to assimilate such a description to the experiences which arise when a sense organ is excited by an agency which is not the proper stimulus of that sense organ, e.g., the experience of light and color when the eye is pressed by the finger or excited by an electric shock. One can assume that the central stimulation travels from the cerebral disturbance to the sense organ and then back to the sensory tract and that, in some fashion, past experience leads to an excitement that approaches that of the original excitement of the end organ, or that the similarity of the image to the original perception is due to the re-excitement of the same central elements, or to both. Such accounts, however, do not place the memory-image that is perceived in that relation to the physiological organism which the original object held. The table stands in what is termed a causal relation to the central excitement which is considered the condition of the experience of perception. The memory-image stands in no such relation, it would rather be regarded as the effect of the excitement than as its cause.

We must, however, remember that the table which we regard as the cause of the perception is not the table that is perceived. The congeries of hypothetical physical particles to which we must retreat in our causal statement of distance experience can have none of the qualities which they have in our experience of them; and, if we assume that perception of color arises because of the central excitement induced by these congeries of physical particles reflecting ether waves which do not in any way resemble color, we are also at liberty to assume that extensional experiences, both spatial and temporal, together with that of the effective occupancy of space, which arise when the nerve endings of tactile, joint surfaces, and muscles have been excited,

are also quite unlike the actual object that has been thought of as responsible for the perception. That we have not felt the necessity of regarding the physical particles, which in their combination are the stimuli of contact experience, as unlike the matter of our immediate experience is due to the fact, already referred to, that the continued subdivision of this matter does not deprive it of its extensional nature, while these subdivisions in the physical theories of color, sound, odor, and temperature inevitably deprive the elements of objects of these very characters. I have also pointed out that contact experience assumes a priority of value because it furnishes the criteria of the validity of the distance stimulation and because contact experiences are assumed to be identical in their extensional character for all individuals, while distance experiences vary with the different positions of different individuals. A third important point, which I wish to repeat, is that the causal interpretation of perception in physical theory conceives of the distant object as made up of elements of contact experience, that is, of what belongs to the result of the act, and so eliminates the time which would be required for the accomplishment of the act, i.e., this interpretation denies that temporal distance has any part in the reality of what is perceived, while spatial extension is regarded as of the essence of this reality. In other words, this interpretation implies that the reality of what is perceived has its existence in a timeless space.

It is possible and highly important to recognize that what is distant from us has the same spatial characters—say, contact values—which it would have if we were in contact with it. It is, however, palpably impossible to say that what is distant from us can have the same temporal characters as that which is in contact with us, otherwise it would not be distant. The distance experience of things is of events that are not there when the experience is ours. Distance experience always implies some sort of a temporal process taking place between the distant object and the organism. If in imagination we place ourselves in the object at the moment in which we have vision of it, or sound

from it, what we find there is not color or sound but particles in motion. If we still assert that the sound was at that spot, or the color in existence at the moment at which we experienced it, it is nevertheless not the sound or color which we experienced; and, if we still assert that there was nevertheless in existence the sound or color of the fraction of the moment before, that color or sound itself implied some eye or ear sufficiently at a distance from it to be at the other end of a temporal process. It is, therefore, entirely logical that in the timeless space which physical science sets up as the goal of its exact determinations the so-called secondary qualities of things should be replaced by physical particles presented in terms of contact experience. To reach the thing that is absolutely contemporaneous with our experience, we have to state it in terms of the sort of experience which we have of what is in immediate contact with us.

Thus we conceive of a world made up of particles which are minute pieces of the matter of contact experience, which have effective occupation of space, inertia, and force—things that are of such a nature that they can all exist at a moment of experience, but not of such a nature that their experience implies a temporal process. It is only such a world that can exist at a moment. It can still be asserted that the color is there as an experience at the moment in question, but it is there as a color located perhaps vaguely “somewhere,” since even the sound or odor is vaguely “out there” and is not in its nature at the point of immediate experience. As an experience it is not temporally of a sort permitting location in the timeless space of the physical particle. If now we note the *experiencing* at the timeless moment, we find that we also have to do this in terms of neural processes.

The color, sound, odor, or temperature is out there somewhere at a distance, however vaguely located. It is spatially distant but also temporally distant. If we undertake to cancel that temporal distance by imaginatively and conceptually placing ourselves in the colored or sounding body, we can only do this by substituting for these distance characters the contact characters

of immediate experience, a process by which we annihilate time and reach a timeless space, or space at a moment. And, if now we seize the present moment of experiencing the distance character and undertake to locate the color in the momentary experiencing of the individual that is absolutely contemporaneous with the contact experience of the individual, we are doing two things: we are stating the distance from the standpoint of the individual and we are stating it in such form that it cannot be the character of the object. We can place ourselves in the distant object at the moment in which we are experiencing the object as a distant object. There its contact value will be that which we are having now in our contacts with chairs, clothes, and other objects. If, however, we identify the color and sound with it as contemporaneous contact existence, we have given it distance characters, and it is no longer there. What we can do is to state what must be its material character in order that in the present position of the individual it has the distance characters of color and sound, and in this statement we must also include the individual. We build up a physical theory of sensuous experience in terms of a matter which can still have contact values of effective occupation of space, inertia, and force, but which cannot have distance values, the so-called secondary qualities.

A dualistic philosophy, of which Descartes' is the prototype, sets up a spaceless time as the counterpart of a timeless space. In the experiencing of the individual there are events which succeed one another in a nonmaterial soul, that is, in a soul or consciousness which has no contact characters. In this soul or consciousness there can logically be only experiencings. The contents experienced are spatial, even those of imagery, and cannot be placed in the spaceless time.

G. THE FUNCTIONAL THEORY OF REFLECTION

Holding the problem within the field of perceptual experience, the method of reaching a spaceless time is the converse of that of reaching a timeless space. The latter calls for the elimination

of the temporal or process phase of experience, leaving an extended world of the moment or the "now." The former calls for the elimination of the world as it spreads out three-dimensionally in the durationless moment, leaving the durational or ongoing phase of experience abstracted from the world in which it goes on. It is evident that this is a single abstraction and that, as we plant ourselves in one phase or the other, we provide ourselves with the content of the opposite conception. Within the momentary world of an ideal physical science we imply the conspectus of these moments, the durational spread; while in the world of pure happening, i.e., in a world of obtruding events, whose sole condition is that they are not what is, that it is only the unexpected that happens, we imply the spread of what does happen in a duration so indefinitely reduced in extent that the differences that are essential to happening may be neglected. It is also evident that it is an abstraction that approaches an ideal limit that is never reached. The world at a moment must include vector elements and the contents of momentum and force that involve motion; pure duration must find its jumping-off place in an extended world that is and its arrival in a continually emerging world that still belongs to the world that is. The *terminus ad quem* of this abstraction is evidently not a timeless space, or a spaceless time, but a situation in which the spatial or temporal content may be safely neglected in conduct. In other words, the abstraction is functional in conduct and belongs to the experience of individuals in whose conduct there appears a world of relatively permanent objects, those in which the character of duration is negligible, and a corresponding durational process that may, for this reason, be independent of its content, and hence be the duration within which the novel arises. Such individuals would be those within whose experience problems of conduct arise, the conditions for the solution of which are fixed, while the solution itself is not given in the relatively permanent conditions.

This situation arises, as indicated above, when the individual through the development of social conduct has reached the

point of indicating to himself the results of past action present in tendencies to response. The association of successful and unsuccessful reactions with the present tendencies to react lying within the larger act constitutes a self that is another object in the field of conduct. In the mutual inhibition of the reactions, the so-called memory-images of the results of past reaction and the characters of things are referred to the responses themselves as too high, too broad, too sour, etc., thus constituting an individual built up out of inhibited tendencies to react, memory-images of the results of the reactions, and the indication by significant symbols of the characters of the things that answer both to the stimuli to respond and to the result of the response. Over against this individual lies an environment of objects that has lost the organization of the field of conduct and can reach a new organization only when a rearrangement of the responses and a corresponding rearrangement of the characters of things makes conduct again possible in a new field of conduct. While this is taking place, the old environment is there as the sum of the conditions of the new plan of action and the new field of conduct. It is there as a duration, but only as a moment to which past and possible future is referred. In the effort to refer past experience and future response to as permanent an environment as possible, the duration with its changes is reduced to the lowest terms. We look for the permanent conditions of possible action, and these can only be found in a world as it exists in a moment.

On the other side lies the examination and reorganization of the elements of the environment, a reorganization that is determined by the formation of the responses into a new composite act. In this duration past and possible futures lie over against a relatively timeless environment. The temporal spread is in terms of past occurrences and anticipated reactions, which are abstracted from an environment that is a relatively changeless situation.

It is important to recognize that the same contents are here that were in the world of immediate experience, when the char-

acters of things, the results of past experience, and their values for the individual were entirely absorbed in the objects, and the individual was reduced to the mere effort of action and the here and now of orientation. There is a new object, the self, to whose experience is now referred the memory-images and the tendencies to respond. This new object has arisen through the mechanism of social conduct, but its contents were in the world of immediate experience. They have been analyzed out of the inhibition of the act and are referred to the self by the mechanism of social conduct. After successful reorganization they pass again into the world of things, and the self is reduced to the effort of conduct and to the point of spatial and temporal departure for the act.

In the reflective phase the attempt to reduce the environment to the world at a moment shows itself not only in the reduction of duration to its lowest terms but also in the translation of the distance values of things, which are essentially durational or temporal in their nature, into contact values. The thing at a distance appears not as a colored or sounding object that calls out an extended reaction to reach it but as it would feel to a hand that was there at the moment, that is, as having the values of our own momentary contact experience, those of the effective occupation of space, of inertia, and force. What is involved here is not simply the filling-out of the distance stimulation of color or sound by the past experience of contact values, tactile volume, and resistance. Such objects are those of immediate experience, and the contact values of these objects are stamped with the same future date as that which belongs to color and sound. The body will be hard when we reach it. It is the reverse of this which occupies reflective experience: the distant object is *now* made up of resistant volumes whose structure is the statement of the present reality of color, sound, and other distant futures. As only contact objects in the experience of the individual have the temporal value of the now, the distant object can be so dated only in so far as the individual in reflection is there as well as here. This placing of one's self outside the individual in tak-

ing the attitude of reacting upon the self arises, as has been indicated, first in social conduct. The basis for it is found in the fact that certain social stimuli, or gestures, tend to arouse in the individual the same response within himself that they arouse in the other to whom they are addressed. Later the individual finds himself giving expression to this tendency and, in thus addressing himself, becomes a self. In his social conduct he has become an object, or other, to himself. For a primitive nature, whether in the child or in the earlier groups, all objects are social, in the sense that they call out social responses, especially when the interest in the objects is vivid. These social objects are but vaguely defined in large part, but the social attitude has served the function of arousing in the individual the contact response of that which later appears as the merely physical thing, when the individual reacts to it. The response is at first that of a something that helps or hinders. When the abstraction of the physical thing has taken place, the response is that of adjustment to the manipulation of the individual and especially that of resistance. It is this imaginal experience of resistance that carries with it the temporal character of the now and serves to bring the whole field of physical objects into a timeless space.

It should be noted that the space of this timeless space is still that of distance experience and normally visual. For this is the extension of our conduct and is subject to far finer discrimination than tactual extension. It is this that gives to our extension its unlimited nature. One can rest in a contact experience without going out from it, but in so far as one, wherever one places one's self, finds one's self in a visual field, one is invited to move to other points.

H. CONCERNING GREEK FORMULATIONS OF THE PROBLEM OF MIND

In early Greek speculation interest gathered about the characters of contact experience—the wet and the dry, the hot and the cold, the heavy and light. The profounder analysis of the

Eleatics came back to the resistant solid extension, incapable of change, i.e., timeless by its very nature.

Speusippus and Democritus rescued change by insisting on the distance, or visual, character of space, and by confining change to motion of particles, and the effects of this motion to contacts of the atomic particles of matter. With this statement appeared the still present problem of the distance values of things, or the secondary qualities. For Democritus they were the effect upon a soul, made up of fire or spherical atoms, brought about by distant objects. The discovery of Socrates and his followers that all the characters of things, which conflict has analyzed out, can be referred to by significant symbols, lifted them into the realm of dialectic, or conversation—into the agora, or into the inner agora of thought. The fact that these significant symbols referred to universal constants in things and that these characters of things appeared as inner attitudes of response in the self, presented what seemed to be a new realm of being into which idealistic philosophies transferred the ultimate reality of the environment from the world of perception. The effect of this was to transfer the reference in experience from the stimulus in the act to its promised result, over from the perceptual world as an appearance to a world of logical forms, or natures, or ideas. The perceptual world, that of appearance, was characterized by its particular instances, which only shared the universals or only imperfectly expressed them, and by its change, in which particular things decayed and perished and so lost their forms or universal characters. The forms or ideas were universal, permanent, and changeless. Thus the ancient world, blurring the distinction sharply presented by Democritus, abstracted the world of immediate experience from that which the significant symbol indicated in social converse.

The effect of this metaphysical attitude was almost to reverse the reference of immediate experience. In immediate experience the reality of the distance experience is found in contact experience. From the standpoint of idealistic metaphysics pieces of inert resistant matter which have merely the possibility of form

were at the farthest remove from the universal types that were located in the world beyond the heavens and constituted the reality of the world of sensuous appearance.

The grounds for this shift of reference can be found, I think, in the character of the problems that occupied ancient reflection. These problems were almost entirely social problems, at first those of politics and then those of individual conduct—those of morals. The first effect of this was enormously to emphasize the social technique of reflection, in other words, dialectic and logic, and to hypostatize those universal characters to which the significant symbols refer. The second effect was to place the universal characters of things outside experience because ancient reflection was frankly unable to find solutions for their social problems either in politics or in morals. They could devise neither an order of society nor a manner of life for the common man which within immediate experience could meet the social problems that confronted him. Social justice, and the union of social solidarity with individual initiative and responsibility, remained practically unattainable, and therefore as fixed conditions of the solution of the social problem were idealized as existences transcending immediate experience. The same transcendent existence was logically assigned to other universal characters of things which were arrived at by the same process of analysis and indication.

A further effect of blurring the distinction which Democritus had brought out between physical things in a contact experience and distant characters which should find their reality in this contact experience was to leave all so-called sensuous characters of things in the world of appearance—all equally, from the logical standpoint, referring to universal forms or natures in a supersensuous world of ideas. The effect of this was to divide the individual on the logical level, leaving the relatively uninteresting processes of sense perception in the world of sensuous appearance, and to identify mind with the so-called supersensuous reason, the power of indicating the universals and relating them to one another. While this was a process, it did not take

place in a time, i.e., in a measured duration. The unitary soul that passed over into modern thought by way of Augustine's writings was an artifact of Christian metaphysics, not the outcome of epistemological reflection.

I. THE NATURE OF UNIVERSALITY AND NECESSITY

There are indicated in these attitudes of ancient thought two orientations of mind, one toward the physical organism as a part of the whole mechanism of the universe, and the other toward a structure of universal values in social individuals and in things which can be indicated by the organized significant symbols of intercourse of the social individuals—toward what may be called a universe of discourse. By the term "universal" is meant that the language symbol as a stimulus can be indifferently addressed to any one of the members of the social group and calls out a response which is adequate to the carrying-out of the social act. Such a symbol, then, fastens upon some character of the individual or thing which calls out a response in any individual that is competent to carry out the whole social act. In so far as the act is not carried out, the attention remains centered upon the symbols and the characters they indicate as presenting the conditions for an unrealized experience. If the assumption of the reality of this experience in another world, or in a supersensuous experience, becomes important for conduct, they are set up as abstract existences, as a world of ideas. It is important to note the two types of existence indicated here. On the one hand, we have the character of the thing which shares in so far the existence of the thing. Thus things are numerable, identical within durations, and have a unity of organization. In indicating the things as existent and their characters we indicate the existence of the characters. In so far as the so-called laws of arithmetic present the technique of quantitative analysis and recombination, these characters have not only the reality of the analyzed things but also the anticipatory reality of the things that will arise. As our experience is that of acts which imply responses which the stimuli call out,

this anticipatory reality is of final importance. The final attainment of it in the response is called experimental evidence or proof. There is the other reality, also anticipatory but given or necessary, of the conditions to which the sort of response that is anticipated must submit. Kant called the reality of the necessary conditions of a possible experience "transcendental."

Necessity in our terms means nothing but the given or accepted conditions of the act that is being carried out, especially the widely co-operative acts with which science is concerned. When the act is estopped, its fulfilment perhaps indefinitely deferred but still eagerly sought, these necessary conditions present the only form of the reality of the desired result and in that sense are said to have a necessary existence. Thus we speak of the necessary justice of the return of purloined goods. They are called ideal existences in both senses of the term "ideal": they are ideal as abstractions from things, i.e., as characters of things that are indicated by significant symbols, and ideal as having a promised reality in the result which the inhibited act seeks. The identification of these two values of the term "ideal" is the essential characteristic of idealistic philosophies

The body of conditions (thus abstracted from the environment) of complex social acts, on the one hand, inadequately carried out or completely frustrated, or, on the other hand, serving as the competent technique for the solution of problems which arise in the conduct of society, constitute either the subject matter of metaphysics or the apparatus of science, while the controlled process of indicating these characters to others or to one's self in outer or inner conversation constitutes dialectic or logic. The definitions given above of logical universality and of necessity call for development at one point. Universality is the attitude of addressing a significant symbol as a stimulus indifferently to any one of an indefinite group to bring about the response that the continuation of the act calls for, where that group includes the individual himself as an other. Necessity is the attitude of acceptance of a reflective situation or elements in a situation as conditions for the possible carrying-out of the

act involved, where the individual, whose attitude it is, is himself one of the group within whose co-operative activity the reflective problem has arisen. The point that calls for development is the membership of the individual in the indefinite group within whose activity the problem has arisen or may arise, and to whose members conversation is or may be addressed.

This membership has already been defined in terms of the game which succeeds play in the development of personality in the child. While in mere play the child addresses himself as an other in the role of an other, mere play does not determine or definitely define the role assumed. In the game, any part which the child assumes is determined and defined by the other parts in the game which the child imaginatively assumes. The organization of all the attitudes of the different parts in the game as determining and defining his own part or that of another constitutes membership in the group that plays the game. I have also referred to it as the attitude of the generalized other in the group. Whether this group is of a restricted or indefinite number depends upon the character of the co-operative activity that is going on. In the logical game the number of participants is indefinite, provided they are willing to "follow the argument" in Socratic phrase, i.e., if they are willing to accept the conditions of the solution of the problem which its statement carries with it in the group activity. This is the import of *semper et ubique*. It should perhaps be added that universality in the object, or the universal character in the object, implies that an indefinite number of objects or characters of objects may serve to set free a certain impulse; and that universality in the individual implies the attitude of response that answers indifferently to an indefinite number of objects or characters in objects. It is the successful completion of the act, no matter which stimulus calls out the response, that identifies the objects or their characters as the same, except for numerical difference. Actual identity in content is merely a "route of approximation" by which we reach differences that are negligible for the carrying-out of the act.

The orientation of reflection in the individual toward the universe of discourse (i.e., the significant symbols, and the universal objects and characters of objects, together with the attitudes of response which such objects and characters indicate—attitudes organized in a co-operative act of an indefinite group of which the individual is himself a member) emphasizes the functional nature of mind.

From the standpoint of reflection, the content of mind for the individual who is unprejudiced by doctrine varies greatly. If he is thinking, i.e., is discussing a matter with himself, he would probably place all the significant symbols in his mind, but things and their characters, universal as well as particular, would lie outside. Again, his own attitudes of response, in so far as he referred to them by significant symbols, would be placed in his mind as ideas. Uncertain future situations, especially when there are alternative possibilities (and these influence one's conduct), would be regarded as mental; while stepping into another room to speak to someone concerning whose presence there was no question would hardly appear as mental. The falling into a new organization of an environment that had been analyzed by conflict and inhibition might lie entirely outside of mind, but suggestions of different ways of acting would certainly be regarded as the individual's ideas. Imagery that enters into perceptual objects would not be mental, but all results of recollection would be so classified, as well as the contents of constructive imagination; while unquestioned past events, especially when recent, would be related as external events and the memory-images of them would appear as extensions of the "specious present."

It is not the character of the content that renders it mental in the reflective process, for even what are called motor-images, or attitudes, appear as the content of outside objects as being hard and offering resistance. From the point of view of reflection two attributes seem to belong to contents of mind: one is that the individual indicates the content to himself, by signifi-

cant symbols, and so becomes responsible for the organization of it and its function in carrying on the act; the other is that the content shall be restricted to the experience of the individual. This latter characteristic, however, is highly ambiguous and misleading in its implications. Certainly outside things common to the experience of others enter into our thinking, nor are memory-images more properly contents of thought than sticks or stones or planetary bodies. The ground for this commonly received criterion of the content of mind is to be found rather in the other orientation of mind.

The mere indication of universals and the recognition of particulars as stimuli that answer to the universals in our responses—the relation called that of implication; the indication of wider responses as including more specified responses—the relation of subsumption; the indication of a specified response as involving the wider response—the relation of inherence: all these may take place in the conversation of an individual with others or in the conversation of the individual with himself. The only advantage that accrues to this conversation with the self—to thought—is that involved in the self appearing in the character of a member of the whole logical group and so speaking for the whole group. The attitude of membership gives logical universality to the indication, but this advantage of indicating logical universality accrues to the individual not in his particularity as a personality but in his generalized character as a member of the logical group. The contents gain nothing through their appearance in the particular conversation of the individual with himself, though he as a personality may gain social prestige and other social advantages through being the one who does the thinking. The whole tendency of the indication of universals and their relations is to abstract from the personal incidents of thinking—the so-called psychological characters of thinking—and to emphasize the universal character of the objects and characters indicated, and the universal response of the group.

J. HISTORICAL ASPECTS OF THE MIND-BODY PROBLEM

Mind as it appeared in the philosophies of Plato and Aristotle was as impersonal as possible. A content which was restricted to the mind of a specific self would have lost its logical universality. The relation of the body to such a mind would be that of providing the specific occasion for the universal thought, or that of resisting and impeding the operation of thought by its impulses and passions. Mind would have a preferential position in the world of universals, being able to identify or recognize them, while the body would represent only certain things whose natures could be recognized.

It is of interest for this orientation of mind in the ancient world that, although the results of a great amount of careful observation are recorded, especially in Aristotle's *Parts of Animals*, there is never any reference to the individual who has observed, or to the conditions under which the observation was carried out. The results of these observations are given in the form of universals. Aristotle's theory of observation given in the Preface to the *Parts of Animals* is that it consists in finding the instances which express the universal with which the observation is undertaken. The precondition for successful observation is that one already has the "final cause" before he can recognize the object. On the other hand, in medicine, where the Greek physicians were in the field of empirical science, their philosophical attitude was generally skeptical. Already in the time of Aristotle, Greek astronomy, which made large use of observation and hypothesis, had separated from philosophy; nor did the later and most productive period of this science and its mathematics play back at all into philosophic thought as did that of the earlier period into Plato's thought. The insistent problem of post-Aristotelian thought was social and moral, but the social problem was for the ancient world essentially insoluble and gave rise only to the metaphysics which hypostatized the ideas in terms of which the problem was stated in the experience of individuals. Philosophy for the individual became largely a propaedeutic for entrance upon a life of abstract think-

ing withdrawn from active commerce with the world—the life of *ataraxia* or the ecstatic moments of neo-Platonism or neo-Pythagoreanism. The particular spatial and temporal experiences of the individual played no part in philosophy except as providing the *terminus a quo* of thinking, and the resistances of impulse and passion which reason was to crush and surmount. I am aware that exception could be taken to this statement by the student of the Stoic psychology of self-control and the Epicurean analysis of pleasures, but I am confident that it does justice to the trend of thought that moved away from the consideration of mind in its particular bodily conditions.

Medieval thought started with the unitary soul of Christian theology, and, while it was divided in a tripartite fashion that harked back to Plato and Aristotle, it was necessary to ascribe to the soul in its entirety the spirituality which these philosophers had ascribed only to the reason and the rational forms and ideas. It was out of the necessity of carrying the spiritual nature of the reason into the passionate and impulsive life of the individual that the conception of consciousness as the dominant character of the mind arose. By translating all the experiences of the self into terms of knowledge, they assumed the spirituality that attached to the reason as the organ of knowledge *par excellence*. Identifying knowledge with all forms of experience brought its own problems, those of epistemology. Thus we find an uncritical representationalism in so early a scholastic as John of Salisbury, while, on the other hand, we find the universal forms appearing as mental constructs or ideas in Abelard's conceptualism. It must not be forgotten that reflection in the medieval world was regarded as primarily occupied with theology and the philosophy which was oriented entirely with reference to theology, and that theology was an attempt to state the theory of a drama that was enacted almost entirely in the soul. The reflective part of the drama of salvation or damnation took place within the mind. It was there that sin damned the soul, or grace saved it. The external acts of the cult

of penitence proceeded from acceptance of authoritative direction from an inspired source. The acts of the individual himself began and ended in the mind or soul. Thought did not extend out into an outer world for its completion, nor did it commence with external problems, at least in the case of the problems about which men anxiously thought. The world was an indifferent stage thrown up *ad hoc* to incarnate and house souls already condemned at birth but still able, by taking thought, to accept redeeming grace. Thus a nominalistic philosophy which was psychologically oriented furnished the mind in duplicate both with things and with ideas, while theology regarded the most essential conduct of the soul as taking place within this mental world, *in petto*.

The outcome of this situation was to place authentic cognitive processes, involving both particular experiences of things and ideas or universals, within the mind, and to set up as the speculative question of the Renaissance and later ages that of the relation of these objects of sense and of thought within consciousness to the objects extending beyond or lying outside consciousness to which they referred. While ancient thought recognized an act of knowledge as authentic only as it terminated in a universal that lay outside the particular experience of the individual, modern thought was compelled to recognize the particular experiences of individuals lying in consciousness as objects of knowledge, thus opening the door to modern empiricism, with its attendant modern skepticism. Ancient skepticism denied the possibility of knowledge if one started with Protagoras from the particular experience of the individual. Modern skepticism, having an object of knowledge in the consciousness of the individual, denied its implied reference to objects beyond consciousness. Thus while ancient skepticism left the skeptic with the comfortable judgment that knowledge was impossible and the objects of thought illusory, the modern skeptic finds himself within a world of states of consciousness whose existence is given in consciousness, and whose contents

continually lead to wider knowledge. Modern skepticism does not lead to the calm and quiet of *ataraxia*, the goal of all ancient post-Aristotelian philosophies up to the final mystical period.

For ancient thought all knowledge was of universals, attained by a rational insight, for which the bodily processes provided at most only the occasion. The nature of knowledge was not bound up with the relations of mind and body but was regarded as the direct insight of the reason into the nature of things. The relation of body and mind belonged to the cosmological description of things and occupied no critical position in the theory of knowledge. It excited in that metaphysical age no insistent interest but found its place in the logical distinction between evanescent particulars and eternal unitary ideas or forms.

The modern world from its beginnings had accepted, so far as it reflected at all, the plan of salvation presented by Augustine in his philosophy of history as the controlling conception of its cosmology. This cosmology found the *raison d'être* of the world centered in the cognitive and volitional attitudes of individual souls—souls whose experience was most fundamentally bound up with their bodies. Men believed to be saved. Knowledge in its most authoritative form was conditioned by sensuous, emotional, and volitional attitudes. The vast undertaking of medieval scholasticism was the adaptation of a theology that was an outgrowth of decadent Greek philosophy, shot through with neo-Platonic motifs and an accepted Aristotelian metaphysics, to this cosmology centering in particular individual experiences. The *Summa theologiae* of Thomas Aquinas was the ultimate achievement of this undertaking, but it failed to harmonize the incompatible attitudes of a knowledge which was the insight of an impersonal reason, and the immediate cognitive experiences of souls immeshed in bodies and a physical world, seeking beliefs from motives that grew out of this relation of soul and body. This incompatibility asserted itself at various points throughout the whole history of scholasticism, but it became the dominant motive of speculation at the time of the Renaissance.

It was of the first importance for the development of Renaissance philosophy that human endeavor, starting from the experience of the individual, his personal problems and achievements, stretched out toward secular goals that challenged the speculative reason. The ambitions of monarchs of the rising national states, together with their policies and those of their religious and political opponents, gave birth to a political theorizing that found expression in a Machiavelli, a Spinoza, or a Hobbes. All started not from a given state eternally ordered by its own nature or by God but from the individuals who make it up. This same political speculation reinforced by mechanical and social discoveries and inventions produced such utopias as those of More and Bacon. Discoveries and inventions led to new theories of the heavens and the earth and demanded a new physical and mathematical science. Men found themselves in vast adventures that started from their own individual experiences and reached out through their own imaginations to hypothetical presentations of different orders and structures and natures of things from those which had been authoritatively presented and accepted. When these hypothetical presentations agreed with later experience, when they had been experimentally substantiated, the new order and the new objects took the place of the old, and the hypothesis was considered as having been a true representation of reality, while the former presentation appeared as an erroneous representation. This forward look toward a different environment presented in hypothesis, and the backward look toward the discredited presentations, turned the world of experience into a phenomenal world of mental representations. Science found two points of contact between this representational world and the world of reality: first, in the individual's observation of the fact that discredited the accepted presentation of the world, for its very disagreement with the mental presentation seemed to place it solidly in a world of reality outside that representation, while the experimental agreement of the hypothesis seemed to be a passage from mental presentation to an outer reality; and, second, in unassailed

mathematical, mechanical, and logical principles and laws that seemed to hold both in the representational world and in the world of fact and experiment. The facts and the ordered structure of things presented the conditions for the solution of the problems with which science was occupied and seemed, therefore, to lie outside the mental field within which the problem had arisen. Empiricism in philosophy started with the facts as both mental and objective, or physical, but, having placed the secondary qualities of things entirely in the mind as a result of the physical explanation of them, could find no ground for not placing the primary qualities also entirely in mind, and finally set about the task of reducing the order and structure of things to those of ideas or mental states, for representations being no longer things became states of the mind or of consciousness. Rationalism, on the other hand, starting with the given and accepted order of the mind and of the world set up a *mundus intelligibilis* of which representations were inadequate and faulty presentations.

Science, standing firmly upon its facts of observation and experimentation and upon the ordered structure which its problems did not invade, remained indifferent to the skepticism that arose out of empiricism and the idealism that sprang from rationalism. Mind, for science, was the agent which in observation detected the fact and distinguished it from the representation, and in imagination and thought constructed the hypothesis and brought it to experimental test. It was further the habitat of the contents of the world which could not find a place in the extended world of the instant to which science reduced its universe for the sake of exact measurement, i.e., the habitat of the so-called secondary qualities, and also of the discarded and erroneous representations which scientific research left behind it.

The actual incidence of skepticism and of idealism was upon the conception of the world as a given determined moral and social order to which man and society should conform, a conception which the modern world inherited from the Old World and from the theology of Christendom. While science is a social

undertaking both because of the social nature of the scientist's mind and because of the social character of the scientist's universe of discourse within which investigation takes place, the conception of a determined social and moral order has no place in the technique and method of research science. The so-called conflict of science and religion finds its ground, in so far as such an opposition exists, in the complete indifference of scientific method to the idea of a fixed moral and social order, which has been an essential part of theological, and in considerable degree of social, theory. The ideal (if not actual) necessity of such an order has been a presupposition of such theory. It never appears, however, as a condition for the solution of a scientific problem. The soul or mind that must assure itself of God, immortality, and the freedom of the will is a different mind from that which is occupied with a working solution for the immediate problem that confronts it. The first achieves its goal by taking reality up into itself, while the second is only a phase in the development of intelligent experience.

We find, then, two different orientations of speculation concerning mind. The first is toward the soul of a Christian theology. This soul was regarded as passionate, impulsive, and volitional but, in all its attitudes, as believing or disbelieving, i.e., cognitional. This latter characteristic has passed over into that of consciousness. It was essential to the eschatology of the church doctrine that this soul should not be mortal. It could not die with the body. What gave to its affective and conative experiences an immaterial character was an assumed continual reference of them to a self and a continual reference of them to standards of right and wrong. An individual that not only loved and hated and willed but also was conscious that he did so (i.e., could refer these attitudes to himself by means of significant symbols and approve or disapprove of them as actions of himself), not only isolated, and in so far abstracted, these universal characters in the attitudes and actions but also identified them in this abstract form with the self as a social object. The physical experiences have also the "idea" or consciousness of the ex-

perience bound up with them. They became immaterial in the same sense as the abstract universals of ancient thought were immaterial, in so far as having an experience and being conscious of the experience were made one and the same thing. It was the identification of the experience with this conscious or cognitive reference which gave the whole soul its immateriality. The cognitive reference, i.e., the reference of a character to other selves and to the individual's self in the same act, instead of remaining a phase of behavior became a stuff, a spiritual or conscious stuff. This stuff was, of course, accepted as the nature of the individual as a social object, i.e., of the self, but it is necessary to distinguish between the individual and this endowment of consciousness, or what has been called the subjectivity of modern consciousness. The self as a social object may simply be there, as other social objects are there. The structure of such a self may be objective, i.e., a being determined by his legal, family, religious, and other relations—the Latin *persona*. Whatever the immediate experiences of impulse and desire, satisfaction or distress, of such an individual might be in determining his values, what he was as a person was fixed by the social structure that was there. He was the political animal of Aristotle. The peculiar individual experiences of the person became rights and duties, goods and evils, prerogatives, authority, crime, punishment, office, etc., only as they appeared in the structure of a personage arising out of the society that made him a social being. What was peculiar to the individual could take on the form of the universal, could become an object of knowledge, only as it took its place in the person which society had constituted. A cognitive character, then, attached to the peculiar experiences of the individual only as they ceased to be peculiar in their nature.

The implications of the theological doctrine of the church involved another social order which transcended human society as it existed in the world, and the evidences of this social order were found in the relations of the individual to a deity that stood above and outside the existing social order. While this

other order was presented in a complex ecclesiastical structure, it was centered about the confessional. The religious drama of a man's life was an inner experience, involving belief which determined the import of the attitude instead of external conduct. From the standpoint of ancient society a man found out what he was from the position and meaning which the social structure gave him. Then he could cognitively assess himself. From the standpoint of the church a man believed in another social order which appeared in his inner relation to God, and on the basis of this social order he assessed his acts, attitudes, and himself, as well as others and the external order of society. His cognitive attitude toward an order of society flowing from his own attitude toward God determined what he was and what was the nature of his own acts and those of others. The religious attitude demanded a credo. The motive in large measure was the seeking for salvation from the wrath to come, and the inner life was predominantly emotional. The credo was not based upon perceptual experiences but largely upon inner feelings. The body was simply the habitat of the soul, not a mechanism of knowing.

I am referring here to the attitude of the naive nonspeculative man. The Scholastic found himself faced with the task of according this attitude with the metaphysics of Aristotle in the form in which it appeared in the Middle Ages, and particularly with the theory of universals developed in the quarrel between the realists and the nominalists. It was the latter who developed the implicit doctrine of consciousness in perception, discovering in sensations the materials of the immediate object of knowledge, which thus became the representation of the real object without; but this did not reflect a reflective problem that grew out of the life of the time. The medieval individual did not set himself and his standards up against the institutions of the community as did the ancient individual at the time of the sophists of Greece. In the religious upheavals culminating in the Reformation he found in his inner religious experiences a basis for an attack upon the authority of the church in its inter-

pretation of the monuments of Christianity, and in the rise of the national states he found in his adherence to a national state and its monarch a ground for attack upon the political authority of the church; but in neither of these situations did the individual find a ground in his own thought for an attack upon the institutions of church or state as such. The medieval individual in revolt was a heretic, not a skeptic. It was not the implication of an object of perception that was itself made up of states of consciousness that afforded the ground of division between the soul and the body. The determining conception was that of a soul which did not die with the body but awaited its further fortunes in a world to come from which this body had disappeared. It was the immortality of the soul, not the relation of consciousness and a physiological mechanism in perception, that fixed the relations of soul and body. The body was the temporary habitat of the immortal soul.

The problem of the relation of the conscious soul and the material body in perception arose out of the scientific conception of matter which was formulated by the time of the Renaissance. It was the new science of dynamics that brought with it the problem of epistemology. The possibility of analyzing a motion into different velocities, and the development of a mathematical technique by which it became possible to measure a constantly changing velocity, gave in velocities and accelerations in velocity new physical units by which motions could be followed to the limit. Laws of physical change were discovered which gave new meanings to things—the meaning of ordered changes which could take the place of the scholastic universals. With the discovery of the laws of change, it became possible to predict the position of objects. The configuration of any system could be determined at any moment if the analysis of the changes and the structure of things could be carried far enough. The world would become exactly knowable in proportion to the possibility of stating it in terms of extended inert matter in motion. There were two implications of this conception, the first being that the reality of the physical world was what could

be exactly known, i.e., the extended matter endowed with inertia and moving according to the fundamental laws of motion. The rest of our perception of matter must be vague and confused, so far as knowing the reality of it is concerned. The other implication, which developed more slowly, was that the structure of a body in terms of its matter and motion was the sole physical cause of all its other qualities in experience.

Thus there arose out of the physical theories of the seventeenth and eighteenth centuries a physical world of inert matter in motion in space and time. This world included our own bodies. What there was in experience in addition to such objects must be placed in the conscious soul. If our perception is knowledge of this physical world, knowledge is radically bifurcated. What reveals extended matter in motion is clear cognition of the physical world. In so far as it is experience of color, sound, taste, odor, and temperature, it is knowledge of the soul affected through the physical body by such a material world. Physical and psychological theories were occupied in explaining these other experiences, i.e., in giving the conditions in terms of extended matter in motion of the states of consciousness which we call "sensations."

K. REJECTION OF TRADITIONALLY PROPOSED CRITERIA OF MENTALITY

Gathering together the various elements which have been regarded as belonging to mind, we note first those particular contents and characters which express the determining influence which the organism exercises upon its environment. A living organism has only such an environment as it can respond to in so far as it receives stimulations from it. Its environment, therefore, is bounded by the capacity of the organism to be affected by it through its various sense processes. Furthermore, the objects that exist in that environment are determined by the form of the responses of the organism. The determining responses in the case of the human organism are those of contact, especially those of manipulation. As we have seen, the object is that of

which we do or would obtain contact experience if we carried out the reactions which the distance stimuli tend to call out, i.e., actually approached it and manipulated it. These different characters which, on account of our sensitiveness, act as stimuli (the so-called sensuous characters of things), and which, together with the selected and organized contact experiences (whether imaged or directly experienced), go to make up the perceptual object, have as the result of various analyses been located in mind. As we have seen, however, there is nothing in these contents which justify us in placing them in mind, since all of them are found also in things which we distinguish from mind. It is not the contents that are mental but the functional process which carries over its mental character to its contents.

Again, what has been termed "intelligence" has been made a character of mind. This intelligence finds its simplest expression in the appropriateness of the response of a living form to the environment in the carrying-out of its living process. Such intelligence as this belongs not only to animal but also to vegetable forms. As a rule, we confine the term "intelligence" to the modification of the response and the selection of the stimulus as the result of past experience, in meeting the difficulties that arise in the life-process. As there is evidence of this adjustment in unicellular forms, and even in certain reactions of plants, and as it is found through ranges of our own conduct that are not usually considered mental, it is hardly appropriate to consider intelligence as such mental.

Again, the self as a social object has been identified with mind. As we have seen, the social object, or person, arises in social conduct. In immediate experience social objects may exist for us without our including in our conduct toward them any implication of mind. An illustration would be found in our movements among persons in a crowd. In such conduct, so far as this conduct involved no reflection, the individual would not locate his own social reactions in his mind. Social objects and social actions do not as such involve mind.

Again, experiences which by their nature can belong only to

a single individual, and which are private in this sense (such as pleasurable and painful experiences, experiences of parts of one's organism, emotional experiences and especially imagery), have been classed as mental. As we have seen, our attitude toward such objects does not necessarily place them in mind. It is not their inaccessibility to others that renders them mental.

Again, consciousness has been identified with mind, or at least mind has been considered as a form of consciousness even if all consciousness has not been placed in the category of mind. The term as we have seen is highly ambiguous. By some, all experience has been considered conscious; such a view would probably exclude from experience the conduct of plants, as well as that of all animal forms when under anesthetics, and most automatisms. It is necessary to define "experience" first if we are to distinguish experience from consciousness, or to speak of conscious and unconscious experience, or even if we are to deny the existence of such a thing as unconscious experience. "Experience," in the sense in which it is used in this paper, refers to that portion of the life-process of any form which includes the actions of the form as a whole with reference to an environment. It does not include, for example, the processes of circulation of the blood, most of respiration, or most of the digestive and assimilative processes. The term carries another implication: the conduct is regarded from the standpoint of the form rather than from the standpoint of the environment. Thus "experience" implies that one is giving a life-history of the form in question, that the statement of the environment would be in terms of objects such as would exist for the form in question, and that the statement of distances and characters of things in the environment would be in terms of the particular sensitivities and reactions of that form rather than any other. This definition of the field of experience is most easily attained when the individual himself indicates these characters in the objects, indicates them to others, but more especially indicates them to himself. That is, it is easier to get the standpoint from the point of view of the individual if he gives it than if it is given by an-

other, but his giving it is not that which is implied in experience. What is implied in experience is that things and events are stated in terms of their values for the individual as revealed in his conduct—and values here do not imply what would ordinarily be called consciousness of the values. This is an intelligible conception of experience, and it enables us to define consciousness, in its various significations, without assuming that consciousness has already been involved in experience.

L. CONSCIOUSNESS AND PHYSICAL ANALYSIS

A common procedure in isolating consciousness is that of stating both environment and form in purely physical terms, i.e., in terms of the physical sciences. Such a statement covers and expresses the whole process and all the things involved in the process, and yet it is a statement in terms of things and changes which do not themselves appear in the experience in question. What is left behind in making this statement may on this analysis be referred to as conscious experience. Thus a statement of the different sense characters in terms of the physical and chemical elements that in their motions are the conditions of these sense characters appearing in the experience is inevitably a statement in terms that are not those of the experience itself. This holds of all our experiences, even those of extension and effective occupation of space, but with this difference: we cannot give a statement of the conditions for the experience of extension and the occupation of space except in terms of extended things, while our statement of the distance experiences (those experiences of things that act as stimuli to getting contact experience of them) is not of things with the characters we are explaining. What we do in these explanations is to present the contact condition of things that act from a distance upon us. The statement of experience in terms of the physical sciences is, then, rather a statement of the whole situation of environment and organism in terms of possible contact experience, in the timeless space of science. This inevitably wipes out distance characters if the statement involves our

placing ourselves in the objects that are responsible for the distance experiences. However, in so far as we extend this analysis to the organism itself, we have taken away the conditions under which even extension and the occupation of space appear, although the statement is in terms of extended matter. Here we have reached a statement of the whole situation in terms which are those of the underlying conditions of experience itself. Although it is a statement into which we can translate everything, including the organism itself, an essential character of experience has gone out of it, and this something is what from this standpoint is considered as consciousness.

Now as the elements which we reach in this analysis are but smaller portions of the extended matter of our experience, portions which can retain in our imagination of them the characters of being extended and occupying space, it is not the absence of the qualities of experience which would lead us to consider what is left out of the statement (i.e., distance characters and the actual contact characters) as consciousness in distinction from what is unconscious. For we are using our contact experience of matter in the presentation of the universe at an instant in the exact sciences. Because we have placed the secondary qualities in consciousness when science has found no place for them in the world of the physical sciences, we are not justified in identifying consciousness with what is left after the scientific analysis, unless we are ready to deny consciousness to our experience of extension and the occupation of space. It is possible for the rationalistic scientist and psychologist to say that this ultimate element of matter in terms of which we state both the environment and the organism is not necessarily conceived in terms of our experience and the effective occupation of space. They may say that what these elements are is outside of possible experience and that the visual and tactual images by means of which we present these elements are merely surrogates for things in themselves that we assume to exist, without ascribing to them the actual characters with which they appear in our imagination. We can say certain things about the char-

acters of these things in themselves which are implied in our experience, but this statement does not involve these characters having the form with which we inevitably clothe them in our imagination, since our imagination cannot itself transcend experience. We can simply, from this standpoint, say that the order and arrangement of these things in themselves are assumed to be what appears as the order and arrangement of the imaged elements without, however, ascribing to these things in themselves the experienced characters without which imagination is impossible. From this standpoint, matter and space and time can be left entirely outside of experience as far as their ultimate reality is concerned, apart from the assumption that their order and arrangement corresponds to that found in experience. Even the existence of this correspondence in regard to order and arrangement would remain only a working hypothesis. In this case "consciousness" could be made to cover all experience, but experience would then be an appearance which implies a world of things in themselves that is to be reached only by assumptions that can never be demonstrably justified.

This is a position that has been variously presented both by the empiricist and the rationalist (both by Hume and by Kant) for metaphysical reasons which need not concern us, though it is interesting to note that both empirical and rationalistic positions have received a certain scientific indorsement. It is the import of the psychological analysis that requires our attention. If the statement we must make of the situation out of which color arises in experience is made the pattern of a psychological analysis, it is difficult to see why the statement of the parallel situation under which contact experience arises should not carry the same conclusion as that which seems to follow upon the psychological analysis of color experience. The conclusion in the case of color is that the molecular structure that is responsible for the absorption and reflection of light waves cannot have any likeness to the actual color that arises in experience. The reason for the conclusion lies in the fact that we substitute on the surface of the object something entirely different from the color,

but which stands for the color. In the same fashion, in the case of the experience within which contact arises, we substitute for the surface and resistance of a body the action upon nerve endings of irritations that cannot themselves be substituted for an extended surface or for a resistant volume. The difference lies in the fact that, when our physical analysis subdivides the body in the account of the physical happening involved in these experiences and thus reaches that form of the body which constitutes its reality for physical science, these congregations of physical particles could not by definition have any color, while they still have extension and effective occupation of space as their essential characters. It may be impossible to identify the experience of an extended and resistant surface with the irritations of the nerve endings on the surface of the skin, but the irritants and the nerve endings can be still stated in extensional terms, while it is impossible to state the molecular collocation which reflects a ray of light in terms of color. Now we may go back to the situation which seems to be the nature of the extended body and say that, since it is by experiences which cannot be identical with the supposed structure of the body that we reach an experience of extension, therefore this picture which we make in imagination of the extended inner structure of matter must itself be a mere appearance which cannot be like the things in themselves of which it is a representative.

While this is an arguable proposition in regard to the experience of extension, it would not interest the scientist in the least, although he at once recognizes that the color or sound experience is one which cannot possibly be of particles which are themselves colored or sounding. The outcome of this is that the scientist conceives of the world as consisting of physical particles, or combinations of them, with such characters as would belong to them if the individual, in whose experience they appear, were in contact with all of them at the same moment. In such a world there would be no secondary qualities. It would be a world of physical particles possessing mass, inertia, motion, and force. So far as these particles exist in a visual space, the

distant stimuli would serve to enable the individual to present himself as identifying himself with each particle, being inside it, i.e., realizing the particle as effectively occupying space and exerting force, which would place it in relation with all other particles. Motion would appear as the integration of the infinitesimal motions, or tendencies to motion, considered as vector quantities. Thus the reality of the motions would be found not in the visual paths but in the inner realization of the tendencies within the particle to move.

In so far as the scientist presents this picture of the reality of the world, he has abstracted from all the content of the world beyond what can appear in these contact experiences, including not only the secondary qualities but also all the meanings and values except those involved in the physical laws or uniformities of these particles and their motions. It would be all that from which he has abstracted that would be placed in consciousness, for, though it is abstracted from, it is not nonexistent. Now all these characters from which this scientific abstraction is made are characters that invite reactions which will take the individual to the object and give him the experiences of contact. The line between these types of characters runs along a functional line of cleavage, not a metaphysical one. As before stated, if the individual puts himself into the contact experience implied in the molecular structure of a colored surface, he recognizes at once that this reality could not be the color that the surface has mediated, but he would not feel either that the color lost its reality in the object when it was at a distance or that the difference in the values of the two expressions of the surface was a difference between a noumenal and a phenomenal existence. Rather he would say that in its contact character it could not be colored, while in its distant position it was colored. The fact that the color implied a contact experience, which implication is justified in the later reaction, does not transfer the color to a consciousness, while the contact experience belongs to a reality that in some manner lies outside of consciousness. Nor is there anything in this abstraction of the characters (an abstraction

which makes it possible for us to present the world as having a momentary reality that is identical in all physical particles at the moment, i.e., that does not arouse a reaction which would take us beyond the moment in expressing its implications) which justifies the location of the reality of the experience in the central nervous system. The central nervous system is a part of a world of the physical things which science has abstracted from our perceptions and cannot be given a preferential position from the standpoint of reality. Its preferential position lies entirely in the relation of the perception to the experience of the individual distinguished from other individuals.

This brings the discussion to another conception of consciousness—as experience from the standpoint of the individual. As we have seen, it is perfectly possible to state experience from the standpoint of the individual without implying what is connoted under the term “consciousness,” for we can speak of the experience of the plant or of the amoeba or of our so-called unconscious experience, and such experience may be presented definitely from the standpoint of the individual plant or amoeba or the unconscious organism. What is actually implied in an individual whose nature involves consciousness is that he is one who is an object to himself so that experiences may be referred to himself, and that as a self he may be a recognized object in past and future experience. In other words, this conception of consciousness is identical with self-consciousness.

There seem to be two features of these experiences. There is the self that appears as an object, and then there are situations within which experiences are referred to the self, in which this reference to the self gives to the experience something that it does not otherwise possess. The self as an object is a social object, but it is not necessary to social conduct or to the existence of other social objects. Such objects may be assumed to exist in the experience of lower animals, and in our own experience, without self-consciousness being present. In the experience in which the self appears, the individual finds himself acting as another with reference to himself. He becomes, to use the expres-

sion already employed, a generalized other, and finds in his experience a group attitude that then enables him to become an object to himself. This expresses what is implied in the etymology of "consciousness" as "an experience with." This connotation comes out especially in connection with the second feature of the experience. We are conscious of things not simply in their existence in the environment of the experience: we mean by the statement of our being conscious of them that we are in the position to refer them to our own experience by this attitude of the generalized other. Not only are the things there but we are able to identify our own attitudes as those of attending to and acting with reference to the things. The basis for the reference to the self is found in the determining character which the organism has in the selection and organization of the environment. This determining relationship is bilateral. The environment determines the organism as fully as the organism determines the environment. The two determinations, however, are of a different character.

M. MECHANISM AND NOVELTY

In general, we consider the determination of the organism by the environment as causal, while we consider the determination of the environment by the organism as selective and, in so far, as constitutive, i.e., the selection of a group of stimuli with reference to our organized activity is responsible for the cutting-out of these elements among physical things and for a certain structure—logical structure—as an object. In our consideration of the environment as determining the organism we reduce both environment and organism to common physical elements when we follow out the causal relations. The effects of the environment upon the organism are mass effects of elements in the one upon elements in the other. Our ability to trace and determine these causal connections is dependent upon our ability to reduce the whole situation of environment and organism to a set of physical particles in motion. In this mechanical whole the operative connections are between the physical elements and their

fields of force. It is only by a summation of these that we can say that the environment, or its objects, affect the organism as an object. The actual reduction of the environment and the organism to such elements is only attained at a certain point, e.g., in the analysis of matter into electrical particles, and electrical effects into fields of force; while in most statements we simply imply such an analysis as an ideal which our scientific method demands for full realization. In this statement of causal necessity we are abstracting from everything in both environment and organism except the physical particles and their motions, as resulting from their fields of force.

When we speak of the determination of the environment by the organism, on the other hand, we imply organisms which have a content which is more than the summation of the physical particles and their motions into which a mechanical science analyzes them. Their living processes are real as processes which reach or fail to reach a consummation. And the objects in the environment have contents which are more than the sum of the motions of physical particles. They are food, enemies, obstacles, protections, etc. These contents always involve the carrying-out of the life-processes of the organisms. In other words, they always involve a future, and a future involves an experience within which that which will happen (is happening in so far as that which is happening always has a bit of the future in it) is uncertain. That which will happen is always different in some respect from what has happened, and this different quality is something that cannot be predicted. In a sense we can predict the future, but what we can predict is always something less than that which happens. Theoretically we can predict to the extent that we can make our statement in mechanical terms, and this implies, as we have seen, that we have abstracted from the determining relation of the organism upon the environment. We can predict the debilitating effect of a disease, but we cannot predict the actual weakness that appears in the experience of the sick person. We can predict that a certain light wave will be experienced as blue, but the actual experience

of blue that supervenes in the experience has a character which is novel and could not be predicted in its ultimate peculiarity. As we look over the past, these peculiarities of the novel as they occurred have lost their interest, and we are interested only in the mechanical conditions that determined their appearance without, to be sure, determining these peculiarities. So that when we predict a series of future events, such as the eclipses that will take place in the coming year, the statement is not in terms of the future in the sense of experience. Our attitude in predicting the eclipses that will take place in the coming year is the same as that in which we determine those that took place in the year in which Thales is reputed to have predicted the eclipse which brought to a stop the battle between the Lydians and the Medes. As this is the attitude in which we make our mechanical statements of the past, we may perhaps say that all predictions are in an implied past. But the expression is ambiguous. Degrees of probability represent degrees of approach to a conceivable mechanical statement. We can conceive of a completely mechanical, though highly abstract, statement of the life-process. In this sense we can say that we have the highest degree of probability of death as the outcome of all life. We can also conceive of a mechanical statement of the whole process of nature, and the question arises whether we can assume that such a conceivable determination of the positions of all physical particles at all times determines in advance what must be the experience of all organisms, even if such a determination does not imply the possible prediction of the actual experiences as they take place.

The question seems to take this form: Is the conception that we form in our scientific research of the mechanical universe as a whole one from which later scientific reconstructions of the universe can be predicted? The answer to this is in the negative. Our conception of the universe as a whole is, of course, never a complete one, but the form that it takes at any one time is one that answers to the view which science holds at that time. This is generalized so far as possible and is made the structure

of the universe so far as that exists in experience. If an essential problem arises in that experience, the implication is definite that the generalization already made is inadequate. Now from such a conception of the universe, one in which an essential problem has arisen, it would be impossible to predict the reconstruction which is required to meet the problem. From the standpoint of the reconstruction that does actually take place in research it is always possible to show the logical necessity by which the new view has arisen out of the old, but such a logical necessity does not obtain from the old view to the new reconstruction. Did the logical necessity that obtains in the new situation exist in the old? The abstraction which we make in our explanation under the new conception, and by which we show the necessity of the advance to the new together with the explanation of the old in terms of the new, is one that can in thought be pushed back into or under the old situation. We can see how men conceived the sun to be going around the earth from the standpoint of our recognition of the heliocentric nature of our system. It would have been impossible to have shown the necessity of an advance from the Ptolemaic to the Copernican theory from the conception men had of the Ptolemaic world. The nature of this new abstraction can sustain both views, both the Ptolemaic and the Copernican, one as explicable and the other as actual; but the views which we hold of the universe at any one time do not carry in them as deducible propositions the new views which will arise in scientific research, though the abstractions that we make with each advance are more comprehensive as they not only meet the new facts but explain the old doctrines.

We have, then, two different attitudes of assurance in the face of the future. The one is represented by perception and the other by thought. In perception the attitude is that of a reaction ready to take place, and in so far as imagery of past experience is there, anticipatory of a certain type of experience, though the result is bound as a new experience to be different from what has occurred. The adjustment of the response to the

sort of experience that is coming expresses this anticipation even where the imagery is but faintly present, or where this imagery is predominantly motor in its character. On the other hand, that which is going to happen must be a constituent part of that which is given and which is relatively unchanging. Novelty and change always appear against a background of that which is old and unchanging. The problem appears in the midst of a world that is itself not problematic. We can present that which is about to happen in terms of what must belong to it if it is to be a part of the world that is. The statement can be only abstract, for what will happen has a content which in some degree is not and cannot be given. In our everyday perceptual experience this abstraction is hardly evident. The pressures we will receive when we place our feet in new places, when our hands grasp things about us, are so slightly different from the actual pressures we are feeling that practically no abstraction is made. As the future grows more distant, or as that which is to occur departs more from the world of experience about us, the abstraction becomes greater. We find that we can give only certain elements of what must take place. If we are to meet a new personage, or one whom we know under entirely new conditions, we find ourselves rehearsing the secure elements of that which is to take place. A certain social structure is given. Certain common standards and interests are involved. A certain common past experience belongs to all concerned. In terms of these given elements we construct a form which the coming interview must take. This structure is an abstraction from the world about us, made in terms of the necessary conditions which the problematic experience ahead must meet. The statement of these conditions is in terms of thought. They have the immediate reality of the given, of the world that is there; and, as the novel experiences that are coming will appear in a world that is relatively unchanged, these conditions determine the form which the new experiences will take. But this form does not determine the content that will arise. The assurance with which we step into the future is that of the adjustment of the life-

process to its environment which is found in the organism, as it appears in perception, but it is not a prevision of the unique experience that will appear.

There is still a further question beyond the predictability of the future experience, and that is as to its determined character. As we look back over that which has taken place, we can give, or assume that we could give if we had all the elements of the situation, the reasons that determine what has taken place. The only situation within which such a proposition holds is a mechanical one, which becomes perfect only when the world is reduced to physical particles, their velocities, and accelerations. In such a world there is no determination as to what elements are in motion, motion and its characters of velocity and acceleration being relative. Such a world, or such an abstraction from the world, does not define the reality of a living being, for a living being acts. Its reason for movement lies within itself, and in that action, as we have seen, the living being determines its environment. The living being acts to reach a certain result in the future, the realization of its act. In this action it may be said to select its own time system and the space that this involves. It thus determines the world within which it lives. Its determination, however, is a selection, and a creation only in the sense of a reconstruction. Undoubtedly new species arise, and with the new species come new environments, but the new environment is oriented with reference to the new species. The form in some sense selects it. If its life-process is to be completed, the objects in the environment must be constituted with reference to this form. New food, new dangers, new refuges and habitats must appear, though there are the same particles and the same forces or fields of force.

The distinction that arises here is between action and abstract motion. Action has reference to a future condition. Motion can be stated with reference to past and present conditions and, in theory, is entirely determined by these. Action carries with it the implication of a certain world of objects within which it can be completed. If it is so completed, it gives us the percep-

tual assurance of the existence of this world or environment of objects. The acts so completed, or presented as completed, can then be analyzed into motions. Motions are relative changes of position, with varying velocities and accelerations, of physical things, which physical things can be defined or measured with sufficient accuracy so that they can be identified in their different positions. In motion we have abstracted from the here and now of the actor. This determination of the here and now can be made at any point, i.e., any point can be regarded as at rest, and the corresponding changes in position that take place can be stated in terms of the motions of the other objects. The actor determines the point of departure, the *terminus a quo*, of his actual or possible motion. He sets up there the Cartesian co-ordinates of space. From the zero of that set of co-ordinates action does or may take place. All changes within the environment are stated in terms of distance experience with reference to that set of co-ordinates. These changes are motions, for it is possible, as in the case of the person in the train, to place one's self either in the train moving in a fixed world or in the fixed environment of the interior of the train, while the landscape moves by. It is the actual contact experience, extended by adjustment to surrounding objects, that determines the co-ordinates. In so far as we adjust ourselves to these objects whose positions are changing about us, either by the movement of the eye or actual or possible movements of the body, they have the future value of possible acts. They have the values of possible contacts determining action and promising certain results. The experience depends upon what action is taken, not simply upon past positions and relative present positions. These changes are not merely motions in the abstract sense of the doctrine of relativity.

If the promised experience of action is not attained, and action is inhibited by conflicting tendencies, a reconstruction of the field of conduct may take place, in which new objects answering to a different form of action may arise. It is in this situation that motions in their more abstract sense appear.

The actual line of conduct is not yet determined. It is only the relative position of things with reference to one another, and their relative changes of position with reference to one another, that may be of interest. This is the situation in so far as we determine the conditions which must obtain for any one of a number of possible acts and so abstract from any specific action. Except in the case of the most extended abstraction, this field of possible activity lies within a world that must condition any alternative course taken. The new objects will still be parts of this bounding, given environment. Our system of co-ordinates is set for this given world that must determine the validity of any hypothesis of action which we adopt. We do not extend the relativity of our attitude to this given unquestioned world. When we present the conditions of possible action within this world, we place ourselves at the imaged completion of the suggested reactions, and all the motions that have taken place have the necessity of their dependence upon earlier positions, velocities, accelerations, and directions; but the reorganization of the problematic part of the environment could not be deduced from these, though it is shot through with necessary conditions which belong to the world as given. In the undetermined future of action a new object, a new *terminus ad quem*, can arise, the necessity of which cannot be said to exist in the conditions to which it must conform. Even the inclusion of the physical organism, its elements and their motions, within the conditions of the solution of the problem does not determine the future goal of the act, for the physical organism so stated is a part of the abstraction. It also contains necessary conditions, but not the novel objects that may appear. The novel element may be very slight, especially in comparison with the given world within which it appears, but in the experience of the individual it was not involved as a necessity of its past. The statement of the abstract motions could not have included the necessity of the particular act. This amounts to the affirmation that all the novelties of living experience are as novelties essential parts in the universe; the fact that when they arose they were unpre-

dictable means that in the universe as then existing they were not determinable, nor in the universe as then existing did there exist the conditions that were the sufficient reasons for their appearing.

This statement implies a distinction between a predictable situation that can be deduced from given positions of physical elements and their motions, including their accelerations and directions, and a future concrete situation carrying with it the inevitable novelty which attaches to every event in experience. There seem to be two phases of this novelty. One is found in the difference, shading from almost complete imperceptibility to utter strangeness, between anticipatory imagery of the result of the act and the actual experience. While this difference is unpredictable, we assume that the conditions for it can, after its appearance, be found in the analysis of the situation as it exists. The difference is never of an irrational character, but its rational character does not imply that the conditions of what is novel in it existed in the previous experience, though the structure of that experience can be now assimilated to the structure of the present experience. The other phase of novelty is found in the hypothetical structure of a future situation, when a conflict of the tendencies to action present an essential problem for which a solution is sought. A theoretically complete analysis of the situation as it existed before the problem arose would not involve the reconstruction that takes place, though it would present the conditions to which any such hypothesis must conform. That this hypothetical structure will be found to belong to the future situation depends upon the success of the action it implies, i.e., upon experiment. The hypothetical structure itself, however, is a novelty that could not be deduced from the former experience as it existed.

N. REPLY TO A MECHANISTIC CRITICISM OF NOVELTY

The mechanist denying the second type of novelty would probably give the following account: Our conception of nature as made up of physical particles with certain velocities, ac-

celerations, and masses does imply that the positions of all particles at all later periods could be deduced from the positions which these particles occupy at any one moment. It would involve simply the substitution of the time variable in the equation of the universe to locate every element at the instant represented by that substitution. Furthermore, the passage from such a conception as that of the Ptolemaic world to a Copernican hypothesis does not represent the actual change from the movement of the sun around the earth to a movement of the earth around the sun but a change in the motions taking place in the central nervous systems of human individuals who study the phenomena of astronomy, and the motions in these central nervous systems fall also within the equation of the universe, so that Copernicus' doctrine could be predicted with the same accuracy by any mind that could grasp this equation as that with which we can predict eclipses. He would insist that this physical structure of the universe exists at all times and, therefore, determines at all moments every situation that can ever arise, however inadequate our grasp of the universe may be. While, then, he would admit novelties as arising in our experience, he would deny that these novelties are found in the physical universe with which his science is occupied. He would say that novelty is a function of two variables, consciousness and error, but that it has no possible place in the world of physical science.

We have seen that this view inevitably wipes out of existence—except in consciousness—all objects except the physical particles, their motions, and the universe as a whole, there being no ground in the relations of these particles for isolating any group of them from the rest of the particles with which they have as genuine relations as those which are conceived, from the standpoint of our interests, as constituting any particular object. There would be from this mechanical standpoint no place for living forms and their environments as they exist in experience, nor would there be any living process with its implication of a future, the appearance of new forms and their correspond-

ing new objects. All these would be found only in "consciousness," though the physical particles that they imply would have a real existence in the physical world.

The question to be asked is the following: What would be the result for the mechanical conception of the world if we lodge reality in experience as it has been defined, recognize living processes, recognize the appearance of new objects in the environment with the appearance of new forms, find among these objects those that answer to what are called the secondary qualities and affective experience, and recognize the rest of what passes under the term "consciousness" as the social conduct of the individual with reference to himself as an object?

It is evident that as long as we assume the existence of a world of given physical particles in motion with given masses, velocities, accelerations, and directions in a fixed space and time, this world will always constitute a noumenal reality of which experience with its objects (including living forms and their environments) will be but appearances, for we shall always refer experience with its novelties to this physical world as providing its structure and necessary conditions. Now there are two phases of the ordered structure of this physical world to be noted: one includes the measurable spatial and temporal magnitudes which our science can identify and, by carrying them down toward ideal limits, can make highly exact; the other includes the spatial and temporal structures which such magnitudes imply. The measurable magnitudes science could not surrender without committing suicide. What electromagnetic relativity with its specialized mathematical technique has revealed is that the numerical expression of these magnitudes can be retained without assuming a fixed space and time. This seems to imply that there can be selected in experience not only characters and relations but also times and spaces, or families of durations.

The ordered relations of magnitudes could still be retained, and be identified in varying experiences, without positing for them spatial and temporal structures which have to be con-

ceived of as independent *of* experience. This does not imply that the space and time, or duration, of experience is a form of that experience which is placed upon the content of experience, as in the Kantian conception, for different families of durations can be thought of as selected in experience in its process.

The question does arise at once of the relation of experience to what we term "nature," for the only conception that we have of experience is of a process which involves a future, i.e., the movement toward a result that will be the completion of the activity. It is the movement toward this problematic future that involves the selection of the time system which determines the spatiotemporal structure of the experience. But experience involves not only a process but an organization of the experience with reference to some individual whose reactions determine the character of the objects, or its environment. We come back, then, to the life-process, and the life-process has a history. In the dark backward abyss of time that we select there was a period in which life could not have existed, and in the forward stretches that we contemplate there may be periods in which no life can exist. What our imagination and thought select and organize is a nature that would be the environment for us which such a history implies. But the particular spatiotemporal structure and its selected objects have only the relative hypothetical reality of our projected experience. What takes the place of the physical elements of nature, with their characters of mass, motion, and direction, are events. As events they pass, but when they pass and where they pass are questions to which intelligible answers can be given only from the standpoint of some experience. As such events they are the most highly abstract of all entities. They are not the ultimate stuff of reality, the noumenal reality of which our experience is an appearance. They are the final abstractions which we make in comparing experiences which are as diverse as we can conceive them to be.

From the standpoint of relativity there is an indefinite number of time systems and their corresponding spaces in nature. Any element or group of elements may be conceived of as at

rest, and all the rest of the universe may be conceived of as in motion with reference to this point; and the numerical statements of the magnitudes involved in such a statement of the world can be correlated with the numerical statement of the world if any other point is conceived of as at rest while the whole universe is thought of as in motion with reference to this point. If we undertake to make an exact statement of the magnitudes involved in each or all of these formulations of the world, we must carry these magnitudes of mass, extension, and motion by means of abstractive sets to the simplest possible situations, i.e., to the smallest dimensions within our power of computation. We must approach points in space and instants in time. This would bring us to the world at a moment as an ideal limit.

Such a limit can never be reached; on the contrary the actual physical analysis must be in perceptual terms. We can never reach a point, but we will always be dealing with some elements that occupy space, have mass, and are in motion, contents which, as we have seen, are in contact terms, while the universe as a whole within which these elements lie must be presented in distance terms, actually those of vision. But our mathematical theory reduces the physical elements to points whose contents are stated in terms of energy. There seem to be two conflicts between the objects of experience which mathematical technique undertakes to present with the exactness of measurement and this technique itself. One is between the perceptual object that must always have an inner extension and content (that of mass) and the mathematical object that must be a point. The other is between the perceptual world as a whole, which in perceptual terms must be in the form of vision, imaginatively extended indefinitely, and thus involving the time element in vision, and the world at an instant, whose contents, we have seen, must be those of contact, and which cannot give the conspectus of a whole which comes with vision.

This conflict in the concept of the physical particle seems to have appeared in experimental physics in the reduction of matter to particles of electricity. The particle of electricity is essen-

tially an electrical charge whose energy has not a direct but an inverse ratio to volume. If we take inertia as the measure of mass, the mass of the electrical particle will vary not in a direct but in an inverse ratio to its volume. Thus the electrical particle as the ultimate physical element approaches that of the mathematical ideal. Matter of our perceptual experience has a mass that, given equal densities, varies directly as the quantity, or volume. To assimilate the electrical particle to the physical element of perceptual experience, it would seem to be necessary to conceive of electricity as indefinitely condensable. The fundamental difference of point of view is evident. From the standpoint of perceptual contact experience, inertia as the measure of mass is a property that will vary with the amount or quantity of matter. Constant division will produce smaller and smaller portions of matter, each of which will have its quota of inertia or mass, and which will be proportional to its volume and will approach a point, but the arrival at the point would be coincident with the disappearance of mass and inertia. From the standpoint of the physical particle as a point with a content of energy, we seem to have a viewpoint that is present in the conception of the center of gravity. All the content of inertia and force may be conceived of as lodged in the center of gravity, and we can treat the body as reduced to this point but endowed with the energy which belongs to the entire extended object. The electrical particle seems to approach this conception rather than that of a particle whose mass varies as its quantity. But the electrical particle still has extension and cannot be dealt with simply as a point. It seems to be here that the conflict to which reference has been made appears.

This conflict between the element of matter as a content whose mass is proportional to its volume and a mathematical point endowed with energy is reflected in the difference between the contact and the visual or distance characters of the perceptual object.

While it is true that a spatial continuum, whether presented in visual or in contact form, is subject to an indefinite division

that never reaches a limit, the ideal limit of the point is given a position in the visual space. The process of crumbling gives us continually smaller particles of what comes to us through contact experience of exteriors and kinaesthetic identification with the mass or force of that whose surfaces we feel, but this content of experience has no ideal limit which would not be an annihilation of the content. The positive identification of the point could not be made by this contact experience, which must always have a content answering to volume, however minute it may be. It is only as it can be retained as a whole in the experience whose spatial relations can be maintained while the subdivisions continue, that a location can be arrived at which is independent of a content. It is this which distance experience, especially in the form of vision, accomplishes. It is possible through an analysis of the two characters of contact experience to hold on to the felt form of the things in the hand or in imagination and to abstract from the content. This amounts to setting up the form as given in the felt surfaces as a distance experience, as occurs in the experience of the congenitally blind. Into this experience enter the experiences of motion as well as those feels of the air and changing temperature and especially variations of sound, where hearing has not been also lost, as in the case of Helen Keller. There is always in a perceptual object, a physical thing, a distance content that is distinguished from what we call the stuff of the thing. This distant whole, whether given in normal vision or in an imaged felt volume, constitutes a continued structural whole whose analysis allows of positions that can give a positive content to the point, which cannot be found in that which effectively occupies the space from within, however far we carry the subdivision.

O. THE MECHANISM OF ROLE-TAKING IN THE APPEARANCE OF THE PHYSICAL OBJECT

In the world at an instant, the ideal situation assumed in exact physical measurement, we thus identify the whole which

appears only in a distance experience with contact experience, including the effective occupation of space.

The effective occupation of space is a content which is to be distinguished both from the distance experience, such as that of vision, and from the tactual experience, i.e., that of so-called passive touch together with the actual kinaesthetic experience of pushing and pressing against solids. The effective occupation of space involves not simply different degrees of effort in reacting to things but also an experience of the resistance which the object itself offers to these efforts. This implies the identification of the individual organism with the object, for resistance which finds its expression in the kinaesthetic experience of effort can appear in the object only in so far as this effort is located in the object. This has been explained by the transfer of the experience of the two hands, or any two opposing efforts of the organism, to the object, and has had a wider statement in Lipps's doctrine of *Einfühlung*. It is the fact of the transfer that is of importance here. There seems to be evidence of its occurring lower than man, for the dog's worrying of a stick is of the same nature as his worrying of another dog. Whether this is the case or not, the fact is very fundamental in our attitudes toward all physical objects. It seems to be fair to assume that it arises first in the primitive social attitudes with their adaptations to the reactions of others. The basis for the attitude of identifying one's effort with the experience of the thing can be most naturally found in the individual's exciting himself to react as the other acts toward him by his own response, and the mechanism for this is found in social conduct. There the individual, in stimulating the other to an impulsive response, may arouse the same response in his own system if he is affected directly by his attitude as the other form is stimulated. This takes place notably in the use of the vocal gesture, or any gesture which can be used for language. When this has once taken place in its most primitive form, there is set up the mechanism for the individual's acting toward himself as an object, a mechanism which involves the individual's identifying himself with

the object—at first the social object. It is this experience which contains the content which is legitimately connoted by “consciousness,” i.e., not only the presence of the object in experience but also the presence of the object in the range of the experience of the organism or individual. It should be added that this identification of the individual with the object is the condition of the individual appearing in his experience as an object and has the importance which this indicates. It follows, also, that this content of the thing is one which is never found in the analysis of the object but is always projected into the interior of the part reached by the analysis and with which again we identify ourselves. Analysis of things never gives us anything more than new surfaces and contours. The surfaces are there, while the inner resistance is something that is supplied from the individual. In supplying it, the individual himself becomes an object. This content of the thing which can never be found directly in the object is presumably the basis for the concept of a substance which appears only in its qualities in experience. It is also the basis for the so-called subjective idealisms, though it is important to note that this use carries with it inevitably the same destructive judgment upon the self as upon the object, as Hume has abundantly pointed out. The self as an object is dependent upon the presence of other objects with which the individual can identify himself.

At the risk of belaboring the point, I wish to insist that the self does not transfer its kinaesthetic sensation to the object but that, through the tendency to push as a physical thing against one's own hand in the role of another individual, one has become a physical object over against the physical thing. Such a development of the physical thing over against the physical self is an abstraction from an original social experience, for it is primarily in social conduct that we stimulate ourselves to act toward ourselves as others act toward us and thus identify ourselves with others and become objects to ourselves. The identification lies in the identity in the conduct of others toward ourselves with that conduct toward ourselves which we have tended

to call out in our own organisms. The child by his cry has called out a tendency in his own organism to soothe himself. The identity in kind of this with the sympathetic response of the parent is the identification of the child with the parent. The earliest objects are social objects, and all objects are at first social objects. Later experience differentiates the social from the physical objects, but the mechanism of the experience of things over against a self as an object is the social mechanism. The identification of the individual with physical objects which appears in the effective occupation of space is a derivative of this. The identity in the response of the thing, and in the response which we call out in ourselves in acting upon a physical thing, is given in embracing or grasping or fingering a thing. The thing presses against us as we press against ourselves. We pass on into the thing the pressure which we exert against it in grasping it, and this is something more than the appearance of its surfaces in our experience plus the effort we exert in pressing. The something more is the location of the act of pressing in the thing, over against our own response, and this capacity for location of the act within the thing by our own action against it is what has passed over to our physical conduct from social conduct—passed over by way of abstraction, for the social object is also physical. Out of it arises in experience a physical self, also an abstraction from a social self. The location of the act in the thing takes place as a condition of the appearance of the physical self, therefore it is not a projection of the self or the experience or sensation of the self in the thing. It is also to be sharply distinguished from the color, or rough or smooth surface, or the warmth, or taste, or odor of the thing. These qualities are there irrespective of what we usually call our consciousness of the thing. We are conscious of the thing, again using customary psychological terminology, when an act that arises in our own organisms is located in the thing. This location is rendered possible because the act has aroused a response of resistance in our own organisms which is also the reaction of the thing upon us. That is, we define the action of the thing

in terms of this resistance which exists in our organisms as an other or as others. It seems to be a reaction that may be located in the thing and which then gives rise to the physical self as an object; it may be recognized as a reaction of the organism and then as the form of a presentation of the thing.

The picture that we get is the following: In the interrelations of organism and environment, the selection of the organism is responsible for the form of the objects in the environment and the organism's sensitivities for certain qualities of these objects, while the environment is responsible through its stimulations for the response of the organism. In certain situations, notably the social situations, the organism stimulates itself to respond as the object in the environment will respond to the stimulation. The identity of the reaction of the object upon the organism, and the reaction which is aroused in the organism toward itself, isolates a content which is now the object acting upon the organism, and now the individual acting as the object toward the organism. The individual so tending to act is the self, and the object is an object of which we say that we are conscious. The physical object has an interior in the same sense that the social object, or the other, has an interior. It is one which is provided by the organism tending to act toward itself as the physical or social object acts toward the organism. Indeed the physical object is but an abstraction from the social object. It is this inner content of the physical object that constitutes its matter, its effective occupation of space. It is further abstracted by physical science as mass for the purposes of measurement, first as the quantity of matter, then as that which is proportional to its inertia. It follows from this identical content of the physical thing and the organism as a physical thing that the physical thing which is distant, that is not only spatially but temporally away from us, can be presented as existing at the same moment with ourselves. The physical object as made up of surfaces is still distant in the sense that its inner reality can be reached only by further divisions, a goal at infinity, but the inner reality is there in the same instant that we are there. But

it is matter only in the sense of this inner reality with its immediately bounding surfaces that is there. The other qualities of material things, their color, sound, odor, and temperature, are not there at the instant. To be there, they have to be translated into terms of matter and fields of force.

This content of pressure in the physical object appears, first of all, as part of the imagery which goes into the object as existing at a distance. The various contact experiences we have had of such objects enter in our perception to make the physical thing what it is in experience. It is only when the individual in social conduct arouses in himself the tendency to act as the other, to press against his own organism as the physical object will press against it, that it becomes stuff or matter of which we say that we are conscious. And it is then that our own organisms become physical objects of the same stuff. This content of the effective occupation of space logically antedates the appearance both of the physical object and of the physical organism as an object. There is, then, a distinction between things as trees, stones, animals, and men, and these things as having the same content in them which appears in ourselves in so far as we also effectually occupy space. It is because the content is the same that it is possible for us to be conscious of physical things, including our own organisms as physical things, for "consciousness" connotes here the identifying of the effects of resistances and movements of things with the efforts made in our organisms in dealing with these things. Given this identity, we can arouse in our organisms the attitudes and changes of physical things and so act toward ourselves as physical things. We can and do distinguish between things and the matter or matters of which things are made. We distinguish between ourselves as social beings and as material things—our bodies. We reach an indifferent stuff, or stuffs, out of which things as they appear in direct experience are made up. It is important to recognize that in doing this we are abstracting from all the other characters of things and that this abstraction has to be accounted for. But it is equally important to note that the character which is the

basis for this abstraction, that of effective occupation of space, is the only character of the physical thing which is common to the thing and the physical organism in the experience. Because we find in our experience colored, sounding, odorous, sapid, and warm or cold objects, we do not assume that we have the color, sound, odor, or temperature of the thing.

P. THE DETERMINATION OF CO-ORDINATE SYSTEMS

There is another phase of the social mechanism which is involved in the appearance of the physical object over against the physical self. This mechanism has arisen out of the organized response of the individual to the group in co-operative activities, in which the individual, taking the roles of different members of the group involved in the co-operative activity, can address himself as a self. This organized group reaction of the individual over against himself I have termed the generalized other. In the wide field of logic and mathematics this represents the universally common attitudes of members of human society in significant conversation and reaction to the environment, in so far as the environment of the race is uniform. This uniform response of all men to the common environment, or the environment in so far as it is uniform, finds its expression in a Euclidean space, with some fixed set of co-ordinates, and a fixed unit determined by some accepted rhythmically repeated change assumed as uniform, such as the revolution of the earth upon its axis, or the vibration of an electron in causing a light wave. In so far as a mathematical statement of the numerical characters of the spatial and temporal magnitudes can abstract from an actual system of co-ordinates involved in our reactions to the common environment, and from a uniform magnitude of the time unit in change, these fixed co-ordinates and units of time systems may be abandoned, and the generalized other would represent this most highly abstract common mathematical technique. Such would be the situation under a theory of general relativity. This brings us back to the two situations within which there is experimental evidence for the relativistic theory,

that of the electrical particle and that of the measurement of stellar changes of a galactic order. This doctrine contemplates the change of the time systems of experience with the corresponding change of space co-ordinates, or, rather, of the whole order of extension, with its temporal and spatial phases. The shift from one order to another answers to the determination of the location of rest, or the—for the time being—fixed set of co-ordinates of space. This fixed set of co-ordinates derivative from the field of rest is oriented with reference to the individual organism and his possible movements toward objects about him. The axis of ordinates runs through the individual in an erect position, but an erect position maintained by tendencies to move in various directions. It is the result of compensating pulls. The axis of abscissas runs from the individual to the object of perception and normally along the line of vision. It is the field within which man's possible motions may take place. For the proper organization of this field it is essential that in movement and arrival the individual should find the resistances which are advertised in vision or other distance experience.

The field of rest is that within which the motion of the individual takes place, with reference to whose resistances and organized positions successful action, both in the expenditure of effort and in the determination of direction, can go on. Normally this field of rest is oriented with reference to the goal, the *terminus ad quem*, in so far as the individual has identified himself with this object which is the goal and has run through it the axis of ordinates which belongs to his own erect attitude. It is through the experience of vision that the whole landscape is geometrically constituted as a field of rest within which the individual moves. Within it other motions take place, but still within a stable environment. Moving things are placed within a field at rest. The establishment of the ultimate field of rest (a fixed space for the perceptual world) involves the ability of the individual to place himself now in one object, or position, and now in another. In the case of the inability to determine whether one's own train is moving or one beside it, the individ-

ual identifies himself now with one situation and now with the other, but from the standpoint of either and of both there is a fixed environment in terms of which the relative changes of the two trains can be determined. The fixed environmental space implies a third position with which the individual identifies himself, and from which he could determine whether one body or the other were moving, or both. This identification of the individual with different positions, or the bodies that occupy them, takes us back to the social mechanism by which thought proceeds. There is, of course, no limit to the assuming of positions outside those involved in the moving bodies, for it is possible to assume that the one taken as at rest is itself moving and that another outside this must be taken. So long as the situation is presented in a problematic form, there is no ultimate fixed space which could be determined in perceptual experience, although for actual motion in perceptual experience there is always a fixed space determined by the act.

These different spatial situations, determined by the answer to the question, "What body is moving with reference to others?" are all visual or distance hypotheses. As soon as one undertakes to act, one has in so far accepted some one of the hypotheses and has a fixed space. This is on the basis of one's expending effort and, consequently, comes back to one's contact experience. Thus our action fixes the earth as stable and the sun as moving, but we find that we can assume that the sun is stable relative to the earth while the earth moves, so that in our elaborate scientific action we proceed upon the Copernican hypothesis. In this case we set up a stable spatial situation within which all the bodies of the solar system move. The movement of the system with reference to other stars, and of our galaxy with reference to other galaxies, introduces the problem in its widest form. While action fixes for that situation a certain spatial situation, this does not preclude the possibility that this whole spatial situation may represent a motion not involved in the present act. That is, we are deprived of any decisive experience which tests our hypothesis. Actual movement as an ex-

penditure of effort would remain unaffected, but the determination of this in visual fields by relative change of position could not be assured.

Q. INADEQUACY OF THE TRADITIONAL MECHANICAL
STATEMENT OF THE WORLD

It is in this world at an instant, derived for purposes of measurement, that the conflicts noted above arise, as well as those of Zeno, and it is in this world that the theory of relativity has its *raison d'être*. For it is in the opposition between this ideal limit and the space-time of experience that the possibility of different families of duration appear.

The world at an instant is an ideal limit that is never reached, is not included in the infinite series, and never could be reached even in an infinite approach. From the standpoint of a world of objects which have a common content of effective occupation of space, a world which includes the physical self as that about which the environment is organized through selection, the world at an instant exists, and has a certain space-time structure which is Euclidean, with a constant time unit. If, by the social mechanism of thought or reflection, an individual transfers himself to another object and organizes the environment from the standpoint of the co-ordinates of that center, he selects another family of durations, another space-time, if the object is in motion while the individual is at rest or vice versa.

The basis for this lies in the assumption that there is in the experience which is organized about the individual and the environment a content of effort in the organism of the individual which is aroused by the pressure of the individual upon the object, and which goes into the object. Because this content is in the organism, the individual may identify himself with the object, and act toward his own physical organism by way of resistance to his own pressure, and thus become a physical object over against the first object. It is this possibility of taking now the one position and now the other that constitutes what is termed the consciousness of the object, as well as of the self

as a physical object. In this process the organism fulfils a double function.

The implications of this assumption can only be arrived at by considering what the object in perception consists of. We find the following contents: First, the characters termed distance experiences. They belong to the object as stimuli calling out reactions of the organism, which involve possible movements toward or away from the object, or adjustments of the organism to its immediate extended environment, determining the path of movements, and the postures and attitudes of the organism at rest or in movement. Their appearance in experience is dependent upon what we term the existence of something in the environment (except in the case of hallucinations) and upon the selective activity of the organism. Existence in the environment connotes a further possible experience of going to the object and attaining contact experiences which would complete the act which is responsible for their selection. The selection may be called a sensitizing of the organism to the stimuli which serve to mediate the impulse seeking expression. Distance characters in experience may prove delusive—the object may not be found to be in the position which the act that it calls out, or tends to call out, indicates. Such distant stimuli of vision, sound, odor, air, and temperature are assumed to exist in the environment, but through refraction, reflection, and adjustments of past experience, or the movements of air currents, the reactions of the organism called out by the stimuli do not lead to the contact experiences which complete the act. Or contents of imagery may have entered into the distance experience which do not correspond to the distance contents which later experience brings out, as in the case of the mistaken recognition of a friend, or the misreading of the printed page. Or such imagery of a distance sort may answer to no contact experience at all, as in the case of hallucinations. The sensitizing of the organism to stimuli may be due to physiological changes, incident to organic conditions, or it may be due to the presence of imagery of the stimulus which would complete the act and which coincides

with and emphasizes the similar stimuli in the environment. We speak of the relation of the object as determined ultimately by contact experience to stimulation as a causal relation. The material object is spoken of as causing the experience of vision, for example, through the intervening physical mediums. This relation is absent in the relation of imagery to the experience of perception. In common psychological phraseology imagery is spoken of as centrally excited sensation. There is, however, no evidence of any mechanism in the central nervous system which can take the place of the external object. For this reason it is assumed by certain psychologists that there is a stimulation of the end organ from the central system which returns to the central tracts and there arouses the tracts to activity which can be spoken of as the effect of the peripheral causal disturbance. This, however, still leaves out the original central disturbance as the causal factor which is responsible for the excitation in the peripheral organ that, in turn, is the immediate causal factor of the experience which appears as image. If we seek for the physical situation in the central nervous system which answers to the image, and which would be responsible for selective stimulation of the sense organ, it is generally stated in terms of past associations with other tracts, such that the excitement of these other tracts arouses the tract in question to an activity which is largely identical with the excitement which was the causal antecedent of the original experience. As there is no causal relation, in mechanical terms, between the original excitement of this tract and the experience of the colored, sounding, odorous, and felt object (as colored, sounding, odorous, and felt), but only an assumed uniform succession of the particular experience upon the particular excitement in certain parts of the nervous system, there seems to be no reason for assuming that, when these parts are again excited, this time by association fibers instead of by afferent fibers from the sense organs, there should not arise the same or like experiences—in other words, images of objects experienced in the past. There seems to be no ground for assigning the physical object as the cause for the full experi-

ence of immediate perception if we are debarred from considering the image as the cause of the secondary experience, unless this is to be found in the assumption that the image does not exist until this excitement occurs, while the physical object is the uniform antecedent of the perception. This assumption is certainly in need of further grounding than it has yet received. The more fundamental question involved is the relation of the mechanical abstraction to the full experience within which the perceived object and the image both appear. It is evident that the mechanical statement, i.e., a statement in terms of physical particles in motion, is inadequate to the object as it appears in the environment and to the experience of the individual as it appears in perception.

The mechanical statement makes an abstraction of the content of the object which is the test of the reality of that which appears in perception, in other words, of the contact value which will be obtained if one actually reaches and manipulates the object. Furthermore, it states this content in the form in which it is experienced as existing at the instant of perception. This form, as we have seen, is the spatially bounded content of effort in the organism which can be located either in the object or in the physical self, and which constitutes the interior of the scientific physical object. In the interest of exactness in measurement, this is found in the smallest dimensions possible. This amounts to abstracting from the content of the object as expressed in its relationship to the environment of the living form, or as determined by any process which could not be stated in terms of a field of force, and from all the distance values. But while the mechanical statement abstracts from these contents, they can all be translated into mechanical terms, though at the expense of their characters as distance qualities, or as objects. The same is true in regard to the part that the individual plays in the constitution of the environment and in the appearance of so-called sensuous qualities. This part of the individual's function can be mechanically stated in the scientific account of the physical organism and its fields of force.

In the case of imagery as content of the object, it is not true that this can be translated in mechanical terms. That which goes on in the central tract of the nervous system of the organism can be stated in mechanical terms as in the case of direct perception, but the content of the image, as something that is there, has no counterpart in terms of physical particles unless one retreats to the original experience which is regarded as the source of the later imagery. One interpretation of this situation in which the image cannot be given a definite spatiotemporal position justified by later contact experience is to deny the image existence by granting it only subsistence. The difficulty with this lies in the seemingly causal dependence of the appearance of the image upon certain conditions in the central nervous system—unless we are willing to look upon the image as a mental state that has reality only as such, and inheres in the object only as an importation, which upon analysis loses its external reality.

The difficulty with this mechanical statement, which places the reality of the object in the physical particles in motion (a presentation which includes the physiological organism), and leaves the distance characters and those belonging to the object as object within the life-process hanging without organic relation to the perception (placed either in a field of so-called consciousness or in a world of subsistences), lies in an implication of the mechanical statement that the object of perception and scientific conception is logically prior to the earlier stage of experience out of which perception and reflection arises, and that this scientific analysis reveals the reality of nature, not only as it was but as it remains in experience, to the exclusion from the same field of reality of all from which this mechanical statement abstracts. To clear up this implication, it is necessary to retreat to the earlier form of experience, before that within which the object of perception and the scientific object appear. This stage of experience is that of bare happening from the standpoint of the individual and of bare duration from the standpoint of the environment. Within it there are as yet no

objects and no organized structure of space and time. The character of this experience upon which Whitehead has insisted is that it is extended in the sense that its durations, whether considered from the spatial or temporal standpoint, always extend over any phase that arises for discrimination. Its continuum is never the sum of additive elements but a given happening or duration within which discriminations take place. The discriminated portions are open to further discriminations, with no limit which can belong to the series of such an analysis. In the movement of this duration, that which appears does not add itself to the next but finds itself within another duration which extends over the earlier.

It is evident that in such a duration there could be neither a perceptual nor a scientific object, for an object persists throughout a duration. Even a duration becomes an object only in so far as its quantitative character is found in other durations, and the quantitative expression for this can be found in some object, generally spatial, which does persist throughout a duration. In an experience which is merely ongoing such an object cannot be present. An organism could be affected by distant stimuli and act appropriately toward them, but these stimuli would not be objects nor would any of the ongoing experiences or events take on an objective form. Such an ongoing experience or event passes, and this passing exhausts its durational content. And yet this event does extend over other events in experience. So-called sensible experience is not a knife edge but a duration. If the end of a durational experience could be present at its beginning and throughout it, there would be the material for an object within it.

As we have seen, this is the case in a perceptual object. It is not simply that through memory-imagery we can see the distant stimulus as hard. If this experience were simply a passing experience, there would be no persistence, any more than the continued vision of the color of the distant stimulus in approaching it would involve the experience of the persistence of the color. It is only when the fact that the same thing is con-

tinually in experience is itself in experience that there appears persistence and a possible object. It is in so far as the organism in grasping or embracing the thing passes on its own effort of pushing against its own expenditure of effort into the thing that the continued expenditure of effort appears in experience. The mechanism for passing on this expenditure into the object is undoubtedly social. It is in the social co-operative act that the individual has first stimulated himself to act as the other acts, and first utilizes this attitude in conduct, and has thus become a thing or object in experience. Then the continued character of the stimulus, calling out one's reaction, passes into experience over against the various phases of the response. So far as the individual is continuously identified with the stimulus in the duration, the fact that it is there as the prospective terminus of the act enters into the experience. The identification of the individual with the stimulus keeps his action with reference to the stimulus always in the experience. The statement just made is inaccurate, for the individual does not immediately identify himself with the object, but the same content is alternately identified with the object and the physical self. This content is the resistance which appears in the organism when it grasps or embraces the thing. When the pressures against the thing are put inside it, it is the object; and, when they are directed against the thing, its surfaces bounding this inside, it is the physical organism. It is easy to recognize that the pressure with which the object resists invasion is the pressure exercised by the muscles grasping or embracing it, though it passes on to the inside of the thing, and that this inside is a content which is never reached by division, which indeed reveals to vision and passive touch only new surfaces. It is also easy to recognize that it is only in so far as the thing gets such an inside that it becomes an object. It will also be recognized that this pressure from the inside of the object appears in the object only in so far as the organism actually or in imagination does grasp or embrace it, only in so far as the organism becomes an object over against the resisting object. It is the attitude of pressure

appearing as an inside of the object and as the reaction to this object that constitutes the possibility of there being objects and physical selves over against the objects, and which constitutes the necessity of their reciprocal character, a reciprocity which has already been found in the correlative nature of the organism and the environment.

The object perceived in distance experience has the content of resistance which belongs also to the physical self as imaginatively grasping it. It exists, then, in the present experience of the organism. The content of its present reality is that which belongs to the here and now of the organism's experience. Its reality has the same durational coefficient as that of the organism. We express this by saying that, though the objects are at distances, i.e., have a reality that could only be experienced by an act reaching into the future, and are affected by a durational coefficient that is different from that of the organism, still the material reality that lies inside all these objects of distance experience is that of a here and now.

It is this combination of the coefficients of the future and of the here and the now (the future in so far as the act as an on-going affair gives the experience of futurity, and the here and the now in so far as that belongs to the immediate attitude of the individual), which presents in experience the object toward which action is directed as persistent, i.e., presents an object the continued experience of which is itself present in experience. This obtains also for the organism as a physical object. Thus the character of the inside of the organism and of the object constitutes what Whitehead calls an adjective of the physical elements extending in a field of force into a causal future.

PART IV
VALUE AND THE ACT

XXII

VALUE AND THE CONSUMMATORY PHASE OF THE ACT

THE relation of mind and body is that lying between the organization of the self in its behavior as a member of a rational community and the bodily organism as a physical thing. The self has as its most fundamental character that of being an object to itself. It takes the attitude of indicating to itself things, persons, and their meanings. This attitude is attained by the individual assuming the role of another, or others, where the attitude is identical. It grows out of the more primitive attitude of indicating to others, and later arousing in the organism the response of the other, because this response is native to the organism, so that the stimulation which calls it out in another tends to call it out in the individual himself. Thus in group activities the individual finds himself, by his gestures, not only mediating the actions of the group but also inspiring in himself the beginnings of their parts in this common activity. It is this stimulation of the act of another in one's self which brings it into the so-called field of consciousness. The stimulation is through a gesture which thus becomes significant. When the activity is an organized one in which the different roles because of their organization all call for an identical response, as in an economic or political process, the individual assumes what may be called the role of the generalized other, and the attitude is a universal or rational attitude.

The rational attitude which characterizes the human being is, then, the relationship of the whole process in which the individual is engaged to himself as reflected in his assumption of the organized roles of the others in stimulating himself to his response. This self as distinguished from the others lies within the field of communication, and they lie also within this field.

What may be indicated to others or one's self and does not respond to such gestures of indication is, in the field of perception, what we call a physical thing. The human body is, especially, in its analysis, regarded as a physical thing.

The line of demarcation between the self and the body is found, then, first of all, in the social organization of the act within which the self arises, in its contrast with the activity of the physiological organism. This latter is relatively confined to itself. Sexually and parentally, as well as in its attacks and defenses, its activities are social in that the acts begun within the organism require their completion in the actions of others, and in the latter cases (the attacks upon and defenses against other forms), except in their combination with the parental activities in play, the social action is one which has a social pattern only from the standpoint of the group or species, not from the standpoint of the physiological organism. Sexual and parental action even from the standpoint of the organism maintain the other or others as part of its own process, so that the pattern of the act in the individual is social. The same may be true in the herding instinct so called, though this is so vague that it is with difficulty presented in details of behavior. But, while the pattern of the individual act may be said to be in these cases social, it is so only in so far as the organism seeks for the stimuli in the attitudes and characters of other forms for the completion of its own responses, and by its behavior tends to maintain the others as a part of its own environment. The actual behavior of the other or the others is not initiated in the individual form as a part of its own pattern of behavior.

In the human organism the pattern of the whole social act is in some sense initiated in the individual as the pattern of his act. The mechanism of this is the effect which the gesture of the organism has upon itself that is analogous to the effect which it has upon the other. In this fashion the organism which is stimulating another organism to its part in a social act can arouse the early stages of the same response in its own central nervous system; and, if the gesture is one which would call out attitudes

of others in the group, and if their responses were organically related to one another in mediating the response of the organism in question, then the pattern of the whole social act could be initiated in the system of this organism.

The pattern of such a social act in the organism of an individual may be illustrated in a game, in which the gesture of the organism is the stimulus to other players to their appropriate responses. Illustrations may be found in any co-operative process in which each individual indicates by his gesture which belongs to his act what the others have to do. When this gesture, as is the case in the vocal gesture, tends to arouse in the individual who makes it the response or responses which it calls out in the other or others, there may appear in his organism the initiatory stages of the act of the other or of the others.

What the central nervous system seems to provide in its higher centers is a set of different combinations of the various responses of the organism to its environment. The indefinite number of association fibers in their connections with the lower centers make possible all sorts of combinations of our reactions, both in spatial and in temporal adjustments. Thus both things and acts are represented in the higher centers, but these different things and acts involve generally the innervation of the same muscles and organs, so that the dominance of any one set involves the inhibition of organizations of centers, though they may be excited. In their organization in a temporal sense, i.e., in the order in which acts succeed one another, they make possible an indefinite number of reactions, which for the same reason would be inhibitory of one another in so far as any one of these organizations is actually the path of the response of the organism in any particular case. It is the combination of any set of such centers which represents in the central nervous system a pattern of conduct, in respect to both things and events. When brought into constant use, they become habits and need but to be initiated to run off with facility. Such a pattern may be called "social" when the action of other organisms is requisite for the completion of the act, and when, therefore, the comple-

tion is dependent upon the organism's controlling its responses with reference to the gestures of other forms. By gestures I mean those parts of such social acts which serve as the cues and stimuli for the appropriate responses of the other forms involved in the whole social act. As we have seen, the human organism may arouse the same response in these higher centers in itself which it arouses through its gesture in the other form, and it finds itself, therefore, in the attitude of the other in so far as this attitude which it calls out in another is called out in itself. If the gesture of the individual calls out not only the response of another but also the responses of a group of others who are involved in the act, these varied responses could be called out in the individual in question, at least in those higher nervous centers where they could only represent responses which could not be carried through but must serve some other function. The immediate function which such a taking of the role of the other serves is that of making the organism an object to itself. The individual in one role can direct himself in another. The striking example is in the play of little children. In the organized game which comes later the child can direct himself in the role of the members of the group who are playing the game with him. In such a situation the pattern of the whole social act becomes a part of the experience of the child.

Such a pattern would only be present in so far as it served a function. The advantage of the individual approaching his own response from the standpoints of those also involved in the same conduct is evident enough. It would need to be present only in the emphasis which it would give to appropriate responses of the individual, though out of it would spring the whole reflective process of deliberation.

A matter of very great importance in connection with this consideration is the organization of the conduct of the individual about this pattern of group activities, and, in so far as these group activities are interrelated, about the pattern of the group conduct as a whole. It is evident that it is only in this situation that a self arises, for it is only in this fashion that the

individual becomes an object to himself, and this character is the mark of the self. The self, then, would inevitably be organized about the pattern of the group activities in so far as they are unitary. In various respects this is the case, and those respects are particularly important to the individual. They are those in which the individual has specific functions, duties, rights, and privileges in the group.

This pattern, however, is not the pattern of the physiological organism. The pattern of the organism enters, as such, into the experience of the individual in the attentive adjustment of the organism to the stimuli which are the occasions for the response. This must be distinguished from the feelings of different parts of the organism which accompany this attitude of attentive adjustment. In these latter cases we refer the experiences of muscle contraction, movement of joint surfaces, circulation, respiration, visceral disturbances, etc., to the self. These enter the experience as organic happenings to the self. In the familiar terminology of physiological psychology we are conscious only of what answers to the sensory portion of the arc, not to the motor portion. The attentive adjustment of the act is in the experience and is determinative of it, but we have no experience of it. It is the organization of organic attitude and selective attention which can be brought into the field of "awareness of" only in certain limited effects.

There are two ways in which a unity may be in experience. It may be there as the actual process of the act and as the nature of the thing, or it may be there as an organization of the phases of the act and as the parts of the thing. Thus placing food in the mouth is an act which has a certain unity, and a tree is an object which has a unity. Both these unities are in experience. However, there is a difference in their structural unities in experience. We can break the tree into its parts, such as its roots, stem and branches, and its foliage, flowers, and fruit, and find in the recognized relations of these parts a statement of the unity of the tree. These parts also lie in experience; and, even if we carry our analysis into minuter parts, these still lie in im-

agination and in thought in the experience. They are parts that we are aware of as we may be aware of the tree. In the case of the physiological act of carrying food to the mouth, we may look at the act from the standpoint of an act of the self and as an act of the physiological organism. As an act of the self it has a unity, the statement of which can be made in the different stages of the purposive activity and in their relationships to one another. The act of the self may be analyzed into the different parts which also lie within the experience of the self together with the relations that connect them. But the organic unity of the physiological act which carries the food to the mouth cannot be so analyzed in terms of the experiences of the self, though the act and its unity are certainly there. Walking, writing, and talking are there as physiological processes as well as actions of the self. We realize this when for some reason the organism refuses to function. Something that was there has disappeared, but its structure is not to be come at by an analysis of the experiences of the self. It is true that we may make an analysis of the different elements of the physiological structure by anatomizing the organism and showing what the mechanism is that must work to enable the act to take place. This analysis, however, does not present parts of the act of the self. They are conditions of the action of the self, but they lie outside that experience.

The process of adjustment of living forms consists in the selection of the characters in the environment which will set free the impulses which maintain the life-process, together with such a spatiotemporal organization of these characters as answer to the pattern of the act that arises out of impulse when the opportunity arises for its expression. Control lies exclusively in this selection with the consequent organization of the environment. While the act in its unity is there in experience, it is not analyzed into parts by the control of the organism, but the selection and organization of the environment are an analysis and a synthesis in which the whole is a sum of its parts. The sensitivity of the organism brings parts of itself into the

environment. It does not, however, bring the life-process itself into the environment, and the complete imaginative presentation of the organism is unable to present the living of the organism. It can conceivably present the conditions under which living takes place but not the unitary life-process. The physical organism in the environment always remains a thing. The act may be presented in terms of the mechanism of physical things that are the conditions for the act, the contractions of the stomach walls, the nervous irritations consequent upon these contractions, the nervous centers within which these irritations appear, the motor paths over which discharges take place, and the muscles whose contractions lead to the carrying of the food to the mouth. This statement in terms of physical things answers to the manipulatory phase of the act. It lies short of the consummatory phase of the act. It is in terms of means and conditions of the act. Its analysis is made through the selective process of indication of those characters which serve as stimuli to set free the impulses involved, and these characters find their reality in the contact experiences which the distant characters lead to or imply. They constitute the parts of the act in these terms plus the relationships which connect these parts in a synthesized whole, but a whole of physical things which are the conditions or means of the act, not the act itself.

On the other hand, the act may be presented in terms of the feeling of hunger, the sense of effort in reaching for what is attractive to vision, smell, and taste, and the enjoyment of the food as actually eaten. Here we are dealing with phases which have been represented as states of consciousness parallel with excitements of the central nervous system that are conceived as aroused by sensory processes. They are all ultimates in the different parts of the whole act. They are want, effort, and satisfaction. They are all values. It is true that hunger and effort lead up to the actual eating with its enjoyment, but they are not indifferent means. As values they do not enter into the mechanical series of physical changes which are stated in terms of the bodily organism as a mechanism of physical things. They

appear in experience, however, more or less embodied in things. The distress of hunger is localized. The food and the implements by which it is carried to the mouth and the sapid and odorous comestible in the mouth are all things. Still they are things which in direct experience have values. They are not indifferent means, in the sense in which the mechanisms of the body, when we abstract what we have termed states of consciousness, are indifferent means. The stomach hurts, and the things we manipulate are interesting, and the food is agreeable. However, the stomach that we feel, the things that are interesting, and the food that is good or bad are at the consummatory end of the act. They are not perceptual things in the sense of being there as material things, whose reality we can identify by getting our hands upon them. This reality can abide while the values vanish. The stomach can become simply an organ, and the implements of the table cease to be interesting, and the food cease to appeal to or offend the palate, and yet they all retain their reality as perceptual things. They have in so far passed out of the act, or series of acts of eating, and we abstract from this act and hold on to this character of their physical reality. In other words, in the perspective of the act of eating they are objects with the values that belong to the consummatory phase of the act. In terms of these values we can analyze the act. The want as expressed in hunger, the interest that attaches to the means of securing the food, and the satisfaction of the food itself are three phases of the act of eating. In the relation of these value elements to one another the act as it appears in the experience of the individual falls into stages such that its wholeness, its unity, receives expression in different parts. Want, interest, and satisfaction—each implies the entire process and embodies it in a particular phase. In this respect they are not composite parts of the act, though the different stages are parts of the whole as a process. In experience, as in life as an entity, the whole is given in the part. In contrast with this, in a mechanism the whole arises out of its parts.

The perceptual object, abstracted from its consummatory

character, continues to exist. It may, of course, have taken on a value in another act. There are indeed an indefinite number of acts within which it may appear with different values. Its identity as a physical object having these different values may not be present in experience, i.e., it may be in each case a different object. The physical object as such in experience is, however, abstracted from these values. In so far it becomes an absolute means, and the tendency of scientific procedure is to analyze it into the ultimate physical particles, the ultimate scientific objects, which are thought of as existing not only in independence of these values but also as independent of all conduct and as the reality of the world within which human beings with the values with which they endow these objects arise. One can approach these physical objects from two standpoints—either as that common character which belongs to objects that have different values or through definition of this common character in terms of the manipulatory contact experience which the hand makes possible in implemental human behavior, leading finally to the mass particles of science into which the more refined analysis of exact physical science resolves the physical things of our manipulation. The implication of the reduction of these mass particles to electrical energy may be put to one side for the present. What is the implication of the assumption of the independent existence of material things abstracted from the values which belong to them in human behavior? They appear, in the first place, as the common terms in which we can translate objects in one perspective of value into an object in another perspective of value. The meat that one eats may be considered from an indefinite number of value points of view, as food, as property, as fish bait, etc., but, to whatever use one puts it, it continues to have certain physical characters which are unaffected by the difference in its value import. From the standpoint of the perceptual judgment of reality, that of manipulatory contact, these physical objects are there in independence of the acts, and they were there before the organism arose and will continue after its disappearance.

XXIII

THE AESTHETIC AND THE CONSUMMATORY

I¹

IT has been the inspiration of universal religions, of political democracy, and later of industrial democracy to bring something of the universal achievement, of the solemn festival, of common delight into the isolated and dreary activities which all together make possible the blessed community, the state, the co-operative society, and all those meanings which we vaguely call social and spiritual.

In this intersection of what Professor Dewey has called the technical and the final, this attempted grasping of the consummation of the complex efforts of men in society to infuse meaning into the detail of existence, aesthetic experience may be isolated as a separate phase. What is peculiar to it is its power to catch the enjoyment that belongs to the consummation, the outcome, of an undertaking and to give to the implements, the objects that are instrumental in the undertaking, and to the acts that compose it something of the joy and satisfaction that suffuse its successful accomplishment.

The beatitude that permeates the common striving of men after an infinite God of their salvation belongs to the cathedral. The delight which follows upon successful adjustment of one's body to the varied reactions to the elements of a landscape flows over into the landscape itself. The pleasure that imbues our bodily and social balance of reaction to a human form inspires the statue. The felicity that animates harmonious movements of men runs through the dance. To so construct the object that it shall catch this joy of consummation is the achievement of the

¹ Reprinted in part from an article, "The Nature of Aesthetic Experience," *International Journal of Ethics*, XXXVI (1926), 384-87.

artist. To so enter into it in nature and art that the enjoyed meanings of life may become a part of living is the attitude of aesthetic appreciation.

I have presented aesthetic experience as a part of the attempt to interpret complex social life in terms of the goals toward which our efforts run. The other parts are the religious, political, educational, hygienic, and technical undertakings, among others, which attempt to look into the future of our common doings and so select and fashion the ends we want that we can direct and interpret our immediate conduct. These endeavors do not carry with them the satisfactions that belong to finalities. They are infected by the interest which belongs to the fashioning of means into ends, to the shaping and testing of hypotheses, to invention and discovery, to the exercise of artisanship, and to the excitement of adventure in every field. It is the province of action, not that of appreciation. Our affective experience, that of emotion, of interest, of pleasure and pain, of satisfaction and dissatisfaction, may be roughly divided between that of doing and enjoying and their opposites, and it is that which attaches to finalities that characterizes aesthetic experience.

And the intellectual attitudes are as markedly different. In the fashioning of means into ends, in the use of tools, and in the nice adjustment of people and things to the accomplishment of purposes, we give attention only to that which forwards the undertaking, we see and hear only enough to recognize and use, and we pass from the recognition to the operation; while in appreciation we contemplate, and abide, and rest in our presentations. The artisan who stops to sense the nice perfection of a tool or a machine has interrupted its use to appreciate it and is in an aesthetic mood. He is not interested in its employment; he is enjoying it. The statesman who turns from the construction of his speeches, the ordering of his statistics, the meeting of political opposition, the whole technique of putting across his projects for bettering conditions and life of children, to the picture of their healthful and joyous life is for the time being no longer in action. He is savoring the end that he is fashioning

into practicable politics. When the individual stops in his common labor and effort to feel the surety of his colleagues, the loyalty of his supporters, the response of his public, to enjoy the community of life in family, or profession, or party, or church, or country, to taste in Whitmanesque manner the commonalty of existence, his attitude is aesthetic. In the arts it appears in appropriate decoration, that which infuses the spirit of the meaning of the instrument into its structure and adornment, that which informs our equipment and mediate efforts with the significance and splendor of their accomplishments. It adds distinction to utility and poetry to action, "the joy of elevated thoughts, the sense sublime of something far more deeply interfused" to our best and finest efforts. It comes in healthful pulses in the most strenuous enterprises, as we stop in climbing great mountains to gather not only breath and refreshment but the charm and magnificence that each fresh *étape* reveals. From time immemorial men have dedicated them as festivals and solemn concourses.

While this aesthetic attitude which accompanies, inspires, and dedicates common action finds its moment of ideal finality in future achievement, the material in which its significance and beauty is fashioned is historic. All the stuff with which the most creative imagination works is drawn from the storehouses and quarries of the past. All history is the interpretation of the present, that is, it gives us not only the direction and trend of events, the reliable uniformities and laws of affairs, but it offers us the irrevocableness of the pattern of what has occurred, in which to embody the still uncertain and unsubstantial objects we would achieve. We import the finalities of past victories and defeats into the finalities of the uncertain future. The solidity and definiteness and clarity of our undertakings are the donation of the past.

All this is healthful and normal. In its perfection it reaches the field of the fine arts, but it involves the creative imagination and aesthetic appreciation of the least artistically endowed of

those who are fortunately engaged in the rewarding undertakings of life. But those that can import the aesthetic experience into activity must be fortunately engaged and engaged in rewarding undertakings. And this means more than the mere adaptation of means to end, the mere successful co-operative fashioning of the goods which are enjoyed in common. The enjoyment of its ultimate use must be suggested by the intermediate steps in its production and flow naturally into the skill which constructs it. It is this which gives joy to creation and belongs to the work of the artist, the research scientist, and the skilled artisan who can follow his article through to its completion. It belongs to co-ordinated efforts of many, when the role of the other in the production is aroused in each worker at the common task, when the sense of team play, *esprit de corps*, inspires interrelated activities. In these situations something of the delight of consummation can crown all intermediate processes.

It is unfortunately absent from most labor in a modern competitive industrial society. But the thirst for enjoyment is still there, as is the imagination, deprived of its normal function. When the goal is too far removed in time and method of approach, the imagination leaps to the ultimate satisfactions which cannot be fused with the uninteresting detail of preparation, and daydreaming supervenes and cuts the nerve of action. Normal aesthetic delight in creation is the recovery of the sense of the final outcome in the partial achievement and gives assurance to the interest of creation. In daydreaming it is the very lack of connection between means and the end that leads one to the Barmecide feast of an end that is not expressed in terms of means. In the aesthetic appreciation of the works of great artists, what we are doing is capturing values of enjoyment there, which fill out and interpret our own interests in living and doing. They have permanent value because they are the language of delight into which men can translate the meaning of their own existence.

II²

1. The artist is attempting to create something, to make it objective enough so that other people can appreciate it. He is trying to embody his own idea of something beautiful so that other people may share in his pleasure. There is always an intellectual content, but more emphatically there is an emotional experience. The artist is trying to embody an emotional experience. Of course, you cannot separate the emotional experience from the character of the object itself; you cannot get a work of art by a bare expression of emotions. What you have to get is an object which answers to the emotional attitude of the artist, and which will also convey that emotion to others.

2. The critic undertakes to present a work of art to his readers in such a way that the reader will be able to get hold of the value embodied and to see how far it is successfully brought out in the object itself. The difficulty is, of course, to state clearly what the value is and to find out how far this value is brought out in the technique of the artist. Criticism must consist in bringing out, first of all, the values, the emotional content, which is there; and, secondly, in showing how the artist has by his technique succeeded in bringing that value to expression.

There is no science in the statement of value. You can to a certain extent get hold of value outside of art. You can in the field of the social sciences more or less definitely state what the values in human history are, and you can show how far the technique of presenting them has gone. In art you go back to emotional responses which are very difficult to define. The principal task of criticism is to bring the value itself into experience. The great critic is able to present the work of art to his audience so that the audience is able to feel that value as he himself feels it; then he turns to the work of art and shows why and how it has succeeded in bringing out that value.

3. There is a certain type of art which belongs to the ancient

² Taken from student notes

world which we cannot reproduce. The Greek statues presented ideas to the Greek communities which modern art cannot do. Our statuary is of a different type. This illustrates the fact that the type of expression continually varies with the situation. It is a means of expressing a communion of values which are found in emotional attitudes. The language of one period differs from the language of others, and the way in which we can express emotions differs. We can never set up a final standard. We do not get the same feeling from classical works of art that the ancient world did. We can appreciate them only in so far as we can put ourselves back into the period, taking, as it were, the attitude of the Greek citizen of the time, and so making it possible to enter into those effects. We cannot, however, set up any absolute standard.

4. There are, of course, involved in thinking and involved in art certain norms. The drawing must present successfully the idea. You can point out whether the object is correct in terms of the idea that lies back of it, what the functions of it are. So you criticize the forms of verse, its measure, its rhyme. Those are standards, but they are, after all, subsidiary, and you have to come back ultimately to the reaction of the object upon a self.

XXIV

MORAL BEHAVIOR AND REFLECTIVE THINKING¹

ONE might wonder whether the process of thinking in problems concerning value goes on as a series of scientific judgments, advancing first from one purpose to another and choosing between the two alternatives with respect to each purpose. That implies, however, a fixed set of values remaining the same. That is the assumption under what may be called Puritanism or Calvinism. There is a fixed set of values—this is good and that is bad—and then the only thing needed is to determine whether this comes under the category of the good or the category of the bad. Such a situation would be fairly scientific. It is illustrated in the field of law in dealing with crime. If one comes under the definition of crime, then one has done wrong; the thinking is perfectly definite. But the actual situations in which we live are continually changing our values themselves.

2. We are all of us in some sense changing the social order in which we belong; our very living does it, and we ourselves change as we go on; there is always action to answer to reaction in the social world. That process of continuing reconstruction is the process of value, and the only essential imperative I can see is that this essential social process has got to go on—the community, on the one hand, and the selves that make up the community. It has to continue not so much because the happiness of all is worth more than the happiness of the individual but, being what we are, we have to continue being social beings, and society is essential to the individual just as the individual is essential to society. That relationship has to be kept up, and

¹ Taken from student notes. Cf *Mind, Self, and Society*, pp 379 ff

the problem is how the essential social values involved can be maintained.

3. Supposing we take a situation of a man who wants to go to school and gives it up because of finding that he has people who are dependent upon him. Seemingly we have two values over against each other. The man might think the dependence of others upon him would have to exclude education. Nevertheless, the person would have to recognize the value of an academic education he is giving up, and such recognition would inevitably show itself in his efforts to independently study and read. Because he had finally accepted another value as seemingly more important, he would have a heightened sense of the value of that which he is giving up. It is just when we give something up that we get the most vivid sense of its value. The individual's way of life from that time on would be one in which he would supplement what training he had had by all other methods. He would not simply give up an education; he would see in what other fashion he could get an education. That is what we mean when we say we do not simply accept one value over against another; what we do is to define them and try to find a way in which we can recognize all the values involved in the problem.

4. We have no more right to neglect a real value than we have a right to neglect a fact in a scientific problem. In the solution of the problem we must take all relevant values into account. It is unfortunate to think of the solution in terms of taking the right value and rejecting the wrong value. This is done because so many of our moral problems are matters of conformity, fixed rules, where we are not considering the ends so much as whether we are going to conform to the rules of the society to which we belong. But in the problems in which values come in conflict with one another, we want to reconstruct our lives so as to take in all the values involved. It is conceivable that we may have to surrender values entirely for the present, but we ought to recognize them and fashion our lives in such a way that we can realize them if we possibly can.

5. Take the problem of whether a man should go to school and get a Doctor's degree or get into business. He has to consider which would be more valuable to him under the circumstances, which will express his interests best of all. It is a problem to him because in a way he desires both and has to evaluate his desires to see which is the greater. There is a conflict of desires just as much as there is a conflict of facts on the scientific side. The ideal, of course, would be to find a way of living that answers to all his interests. The interests in this case are those aroused by the specific problem. The real problem involves his whole future life. What I want to bring out is that the conflict between these two suggestions is really a conflict between hypotheses. As soon as a definite suggestion comes up, the individual thinks of another thing, and so on, he thinks of them because at once he feels the restriction of going into academic life where the financial rewards are smaller. Then any suggestion considered at once brings out some sort of a conflict, and that is stated in terms of a different hypothesis. What would be an ideal solution, as I have said, would be a way of life which would answer to all the interests. The hypotheses represent the conflicts between the different desires in conflict with one another. The problem is not just a problem of deciding whether to go into business or into an academic career; it is a question of whether the individual can get the interests that are his together in one sort of life or another. You take into account, in other words, all the values that arise, even when you reject certain values for the sake of others. You have to bring them all into the account. Your position in this field is like the position in the scientific field, where you have to take all the facts into account. The scientist that does not do that is morally wrong. On the valuational side, too, you must take into account all the values; you are morally wrong there if you refuse to consider certain ones. So the imperative you are under is to take into account all the values involved in the problem as far as it appears. And your solution has to have reference to all of them. It may not enable you to realize certain particular ones, but then you reject them

on account of a greater value. If you go into the academic career, it is because that type of interest is more fascinating to you than the financial rewards you will get in business. But you must take all values into account.

6. Take the metaphysician who succeeds Spinoza and Hume—what must be his attitude if he is going to think clearly and properly? He should take into consideration all the values that previous philosophers have worked on. He has to get these values into the universe in which we live. There are, of course, such values as Spinoza and Hume have given: the comprehension of the situation does enable us to get out of the narrowness of our various experiences; while, on the other hand, the recognition of the inadequacy of our conceptions frees us, of course, from them. The moral is that you have to bring all these values in and make them a part of the statement which you are trying to formulate of the universe.

7. When we actually get two values into our experience in conflict, they appear not so much as ultimate satisfactions as in terms of the process of getting them. What we actually think about is the process of doing this and that. We want to do both, and then we present to ourselves the action as going on. In presenting the values in terms of imaginary experience, we bring them into relation, and we finally find ourselves doing this rather than that. We state values more in the actual process of carrying out the project than in terms of pleasure and pain, and then we bring these projects into relation with one another. We may be able to get both of the values by rearranging our conduct. We can state our ends in that sense in terms of means in reflective thinking. We see how far one value can be brought into harmonious relations with the others it conflicts with. Thinking is a process by means of which we do not simply put one value over against another; it is a process by means of which we can conserve, as far as possible, all the values involved. It is a mistake to interpret thinking as a selection of one value and the rejection of the others. We want a full life expressed in our instincts, our natures. Reflective thinking enables us to bring

These different values into a field of possibility. If we can bring all the values involved in the conflict, that is an ideal solution. From that standpoint reflective thinking as a technique is of supreme importance. It has the advantage in the field of value which scientific thinking has for the environmental problems we meet. By its means we try to reconstruct our world so that the two values shall both be brought in. Reflective thinking should lead us to recognize our values and help us to reconstruct our world so that as far as possible we can attain all of them.

8. You want to do something very much, but if you do it you will have to give up certain other things. Now, the important thing in your ethical situation is to state these actions as they define one another. Doing this thing, buying this particular object, means that you shall not do this, that, or the other thing. State the thing you are going to do in terms of the things you cannot do, so that they are clearly presented in their relation to one another—that is the fundamental thing in the ethical situation. Be able to state that this particular good thing means not doing something else, so that you evaluate them in terms of each other. Is this thing more worth while than another? You are actually weighing, so to speak, one over against the other. The important thing in moral behaving is defining the ends in terms of each other so that that which is excluding something else can be definitely stated in terms of the exclusion.

It does not mean you choose one and give up the other, but that you may reconstruct the situation so that you can get both. First of all, you aim to get ends before you, and in terms of each other. You can take that procedure into any problem you have where you are uncertain as to what to do. If you can take a particular object state itself in terms of the other aims involved, you have done as much as you can in terms of thinking. It comes back to these values. What are they worth to you? What are you, as identified with this end? What sort of self are you? That is, of course, the element of thinking, then there is a further statement of what you may call the hypothesis

under which you are going to act. Now, you should not in any ethical problem leave out of account any end; even if it means a sacrifice, your conduct has to acknowledge that and take it into account. You give up something of value, and your conduct ought to recognize that value. Your final hypothesis, then, must take into account all the values involved.

You must bring into the field all the values involved and state them in terms of one another. And then, when you make your hypothesis, it must recognize the ends. A value is a value even if it has to be postponed; it is a value and has to be recognized as such. Now, clear thinking in the face of a problem is a value itself, and it is a value which is always essential to this phase of right conduct. It becomes, then, a value in itself. Of course, when we say it is a value in itself, we mean it is a value in so far as it enables us to act morally when trying to find out what is right. It is a value which in this sense is always present.

9. We have to allow all the ends or values involved to get into our decision—that is about the only statement in terms of method, so far as the ends themselves are concerned, that can be set up. That is the point at which we fail, if we do fail, in ethical thinking: we ignore certain values. The important thing is to bring all the ends involved into our thinking.

10. The moral question is not one of setting up a right value over against a wrong value; it is a question of finding the possibility of acting so as to take into account as far as possible all the values involved.

XXV

SCIENCE AND RELIGION

CHRISTIANITY has not been simply a religion, embracing a gospel of salvation of the human soul in this world and the next, and a theological account of God's creation and government of the world; its gospel and its theology have carried with them certain assumptions in regard to human society and in regard to man's place in the universe which have been of very great importance in the history of the Western world. They have been of more importance because the average man has incorporated them into his life without thinking about them or even recognizing them. One of these assumptions is that all men should belong to a universal society in which the interests of each would be the interest of all. This assumption Christianity has in common with the other universal religions. Christian doctrine assumes, to be sure, that because of human depravity such a society can be realized only in a world to come, not in this world. In certain experiences, however, we attain the attitudes which belong to such a society, and it belongs to the rationalistic character of Christian theology to assume that if men were entirely reasonable such a society would come inevitably into existence. The effect of this underlying assumption is not only to be found in social and political theory. In every great popular revolution in which the old and traditional social order has been attacked in the name of reason men have attempted to make a universal gospel out of the revolution. International propaganda has been a logical feature of both political and economic revolutionary theory. Furthermore, when men commenced to realize that the processes of trade and industry ran beyond the life of the self-contained communities of the medieval world, the Puritan found in the morale and discipline of business a behest of God. Again, it was the doctrine

of the church that the world had been created by God to carry out his purposes. The world was, therefore, the expression of his divine intelligence. Whatever occurred in the world followed from the action of the divine will directed by the divine mind. When, with the science of the Renaissance, men began to interpret nature in terms of matter in motion, and read these in terms of mathematics, they commenced to think of the Creator as the great mechanician and of his intelligence as expressing itself in the perfection of inviolable natural laws. There would seem to be no greater chasm than that lying between the popular view that every operation of nature—the rain that fell from heaven, a plentiful harvest or a famine, a plague or an earthquake or the advent of a comet—came as the direct action of a divine providence and the scientific conception of a nature governed by immutable laws. And yet they both had behind them the same thought of a supreme mind which ordered the world after the manner of its divine intelligence. What changed was the idea of the manner and fashion of that supreme intelligence. Inevitably every perfection must be ascribed to that mind, and what could be more perfect than the skill which could achieve the infinite complexity of the world by the operation of those simple laws which by the same formula described the fall of the apple and the sweep of the planets and the stars in their orbits? The religious doctrine that the fall of the sparrow and the very number of hairs of our heads were ordered by God assumed that there was nothing, however minute, in the world which would not be intelligible to a mind that could follow the mind of the creator and governor of the universe. That our finite and fallible minds sank helpless before the task of reading God's purposes in no whit detracted from the necessary intelligibility of the world. That God rationally pursued his ends in every detail of the material universe was an assumption that lay in the back of every man's mind. Undoubtedly, the idea of that reason was vastly different in the mind of the yokel and in that of the theologian and in that of the scientist, but they all agreed in believing that God attained his ends in the smallest details of the

world he had created as the theater in which were to be enacted his vast designs. Just in so far as men could penetrate the manner in which God worked, the world must be intelligible.

There are two ways in which a great complex structure may be intelligible. It may be intelligible as a whole, a whole that is necessary to interpret its parts. So one must see the complete edifice to understand the parts in their relations. One must grasp the whole plot of a drama to comprehend the import of its details. And it is this type of intelligibility which theology has ascribed to the world. It must be intelligible, though we cannot grasp the whole infinite purpose which transcends our view and our comprehension. Some outline of this whole God has given through inspired monuments of the church, but the intelligibility of all the details in terms of the whole structure and outcome of things and events we must take upon the faith that sees through a glass darkly. Theology has been satisfied with this intelligibility of the world.

There is another type of intelligibility which is akin to that of the separate words in which the drama is written and read. It is the intelligibility of the medium of expression. So we may not as yet catch the meaning of a wall as a part of a whole cathedral whose plan we have not seen and cannot guess. We can, however, understand the courses of bricks and cut stone as they are put in place. We know their tensile strength and the binding power of the mortar. We understand the stresses and strains, the thrusts of arches, the resistance of the foundations reaching the solid strata below, and the crushing power of the ascending pile that it carries. A competent architect works in such an intelligible medium. The parts of his structure must not only have meaning in the perfection of the whole but they must also have meaning in the relations of each part to each other as they go into place, in accordance with the physical laws of masses in motion. It is this intelligibility that the science of the Renaissance period undertook to discover in the structure and operation of the physical universe. The architect was supremely intelligent not only in his design; he was equally su-

preme in his intelligence as a technician. He worked in a medium of his own creation which was understandable to all who had learned its language, and that language was the mathematics of the physical sciences. To assume less intelligibility in the processes of nature was to detract from the perfection of the Creator.

It is this belief in the intelligibility of the physical universe which has passed into the minds of men and appeared as the assumption of the uniformity of nature in the operation of natural laws. The assumption was brilliantly justified by the discoveries and inventions which have increasingly crowded the pages of the history of science and technology since the days of Galileo. It became the postulate even of the man upon the street that everything that happened was in this sense at least explicable. We speak of it as the passing of superstition and magic, and it has become the hall mark of the civilized mind of the age of the Enlightenment and the nineteenth century. It has reached beyond the theological mind out of which it sprang, especially in the fields of exact science and philosophy, but in the back of the mind of the average man it has never been at variance with his theology. The laws of nature were the laws of God. They were the orderly manner in which He operated, and order was heaven's first law.

It is difficult to estimate the import of such profound assumptions upon the minds of men, especially when they are taken imperceptibly and without debate, and the very progressive life of society justifies them. It was of the first importance that whatever conflicts arose between the findings and formulations of scientists and the theologians of the churches, this fundamental assumption accorded harmoniously with church doctrine; for this assumption did not undertake to formulate the purposes of God but only reverently to follow his orderly procedure. The conflicts of science and religion grew out of historical criticism of the monuments of the church and the doctrine of evolution, especially in its application to the origin of man. To the mind of the average man the creation of the world and the beings that

inhabited it and God's occasional miraculous interventions did not contravene the uniformity of natural law. This uniformity rather provided the appropriate background for the import of that creation and the miracles. We have to turn to unexpected recrudescences of magic and superstition, and the not so distant history of the burning of witches and the magic-ridden medicine of the Middle Ages, to realize how short a time ago it was that this view of the intelligibility of the world entered into the structure of men's ideas.

Stated as the mechanical view of the world it has had its detractors. And yet it is a period that has produced poetry and romance that has been more widely read and assimilated than in any previous period of the world's history. But what demands especial emphasis is the mind that it has created over against nature. The assumption that nature is intelligible has spread before men a book of knowledge with an incitement to learned and scientific curiosity that has given a new character to mind. It has carried the thought of the informed man into nature so as to make his thinking at home in the world. His own intelligent and mechanical control of his immediate environment is found to be of a piece with the processes of the heavens and the motion of molecules and electrons. Whatever other effects the reduction of nature to masses in motion may have had, it has stretched the operations of the workaday human intellect to the farthest confines of the universe that we have become acquainted with. If it has swept mythology out of the world, it is because man's instrumental mind has occupied its place. It is true that but relatively few have been possessed by this scientific curiosity, but practically all have realized that the book is there to be read by those who will acquire the language in which it is written.

The outstanding expression of this is found in the apothegm that knowledge is power. The Renaissance was the period not only of Galileo but also of Bacon, the author of the *New Atlantis*. Invention has gone on step by step with discovery in science. The intelligibility of the world to man means not only that he can comprehend it but that he can use it. The things

around us no longer have metaphysical essences. Things are to be made out of the indifferent matter about us, as the divine Creator made them for his purposes. Man may change his world if he comprehends its laws. And this attitude has given another character to mind. We express it in the vague term "progress." It is not necessary to specify the motives that have driven men to completely reconstruct their habitats. They lie probably too far down in human nature to be as yet completely assessed, but what has opened the door to their operation is the power that has come to modern man through the intelligibility of natural processes. Men have set out upon this task of refashioning the world in which they live because of the analytical method of modern physical science. Unquestionably the most important results have been the enlarged societies and the increased interplay of social forces which these inventions of means of transportation and intercommunication have brought with them. We are too immediately in the midst of these social reconstructions and developments to estimate them, but we can estimate something of the mind that is the instrument of them.

I have presented one aspect of this mind, its assumption of the intelligibility of nature, and the consequent at-homeness of the human mind in the world, and the second assumption that this comprehensible world can therefore be controlled. Man is essentially a tool-using animal, and science has implemented him in an extraordinary degree. It is important to recognize that this change of mind has had directly to do with the way in which men accomplish their purposes and seek their values, not with the purposes and values themselves. It has given men entirely new tools and new ways of using them; it is only indirectly that it has changed their ends and values.

Certain of these indirect changes can be recognized while they are taking place, notably in education and in public hygiene. It is within a century that it has been recognized that popular education is essential to the modern community. And it has come about not because there was an antecedent demand for it but because modern inventions have made it possible. Perhaps as yet no one could give a satisfactory statement of the social

values which the newspaper has created and may create in the future. It has developed as a huge institution out of inventive genius and narrow-range curiosities and advertising possibilities. Whatever else it is, it is one of the greatest educational forces. We must find out what it is to use it. The changes that science has initiated have reconstructed our universities and created many other institutions of higher learning, and they are unable to keep up with the number of students either in their physical accommodations or in their methods of instruction. No one has an answer to the question: Just what ought to be the training that should be given to those who enter any one of our schools, from the kindergarten to the graduate departments of our universities?

In hygiene we find certain definite values which science has given to us. We do know how to live healthfully, and we understand a great deal more about the values of infancy than we ever have before. We know that we can rid society of certain unquestioned evils in diseases and decrepitude and proceed here logically toward certain new ends that science has opened out before the community. But there are questions in regard to values which medical and biological science has presented to us that the community is by no means ready to answer. Shall we breed a human race with the same scientific intelligence that we use in breeding cattle? Shall we meet the problems of overpopulation by birth control? Science has put in our hands means of controlling life such as former generations never dreamed of; and the effect is to present values that have been enshrined in the family, the nation, and religion in such strange guises that we are embarrassed and are forced to face the problem of restating the values, and for this science presents us with no technique. In industry, scientific control of the means of production and distribution has produced its most outstanding result. We call it the Industrial Revolution. The inventive use of the control which science has given us over natural forces and materials has lifted production entirely out of its former place in society and given rise to self-conscious social groups with ends alien to the old society; and certainly political economy can in no way

enable us to formulate what should be the values that should determine our economic processes.

In government the mechanisms of the modern world have made democratic control in some form a necessity of the state, but they have certainly not clarified for us the functions of government. Scientific control of our means has transformed efficient warfare into national or international suicide, but it has not shown us how we can surrender it and preserve the values that gather about the sovereign state.

In religion, health, and disease the loyalties that have gathered about the family and the state have always played a dominant part. The changes to which I have already referred are removing these values from the peculiar scope of religion; but, as we have seen, these changes have brought no adequate method for restating and controlling these values. Our approach to the control of crime through changed social conditions has so changed our views in regard to the deterrent effect of punishment that the conception of hell has largely disappeared; and the mystical experiences connected with heaven carry with them an appeal to relatively few in the community. In a word, the power of the world to come has to a great degree disappeared from religion, but the values which this has served in the community in the past have been but inadequately cared for. There remains the conception of a moral order in the universe which is fused with the relation of the personal self with God. As one writer has expressed it, religion is what we do with the solitariness of the human soul. The reply of the universal religions has been communion with God. But this has always been mediated through traditional cults which have been a part of the social control of the community, and the effect of the changes we have been discussing has been to profoundly disintegrate these cults and their emotional responses; and yet the demand for the relation of the self to the universe remains unsatisfied and unmediated. The world has never been so intellectually intelligible as it is today. The human mind is more at home in the galaxies of the heavens and in the infinitesimal minutiae of its atoms than ever before, but this intellectual comprehension together with

the enormously increased control over the physical and social environment has left society the task of stating definitely to itself what the ends are for which these means shall be used. These statements in the past have been given in traditional institutions and cults. The church, the state, the family, and the school have been felt to embody these values, and society has felt that in preserving these it has conserved the values which they have represented. The effect which scientific advance has had upon these institutions has been to vastly increase the facilities of operation, but for that very reason we find ourselves faced with the question of what the values are for which they stand. What is education? What should government accomplish? What is the function of the church? It is such questions as these which the very triumphs of science are placing in front of us. The wealth of means to accomplish our ends is compelling us to ask ourselves the embarrassing question what those ends are. The old formulas are no longer adequate.

It is in no sense discouraging. It is, in fact, invigorating. Life is in no sense less interesting. Its values are there and are as precious as they ever were. But we are forced to redefine them if we are to use our means to secure them.

Nor is it a theoretical problem. It is through the use of the means that we advance to the redefinition of the end. The school by the very facilities which are placed at its disposal is slowly enabling us to gain a new idea of the training of the child in terms of his own experience, but we must have that training in mind and not the formulas of an outworn institution. Self-control of the whole community can only be attained by the intelligent comprehension of the issues before it, and the wealth of means of comprehension and of publicity is setting that goal concretely before us. We are coming nearer than ever before to understanding what is involved in providing the community with the goods it needs for its life. In a word, science is enabling us to restate our ends by freeing us from slavery to the means and to traditional formulations of our ends.

XXVI

RELIGION AND SOCIAL VALUES^{*}

AS A physiological organism we can abstract man from society and speak of him as a creature who lives in a certain environment and reaches his distant goals and avoids dangerous objects. But the self, as such, is a social entity that is more than a purely sentient organism, more than a living machine. Now, the self is what evidently is not "at home" in the universe in the same sense that organisms are "at home." It is there that we find what is represented as the need for salvation. We always carry ideals of a social order which is not found in the conditions under which we live. Those social orders have always been in mind, as orders which are essential for the at-homeness of the self in the universe.

Religion is unquestionably a social affair. Its ideals have always transcended the situation in which men find themselves, unless perhaps one goes back to a very primitive community. The physiological organism is quite at home in its environment, and the physical machine is at home in its environment, but the society made up out of selves is not. It is trying to extend its control. Before science men tried to control the world by magic. The ends of magic and the ends of science are not essentially different; it is the means that are different. The magician and the medicine man were undertaking to control the environment in the interest of certain social ends, just as definitely as science does, but they did not succeed in any such degree.

There always is before us, then, the conception of some sort of an order of society which would be better than that order of society in which we exist and in which we would be, as selves, more at home than we are at the present time. I think that that is a naturalistic statement of the demand for at-homeness in the

^{*} Taken from student notes.

world and a fairly reasonable one. As social beings we are not at home in the world because we demand a different social situation and a different environment. We may project that into a world to come, or back to a Golden Age, but the social order in which we are actually existing is not one in which the self, as such, is at home.

2. Suppose that society fails to exercise the sort of control over its environment which is somewhat implicit in its life. Suppose the sufferings that come from natural causes cannot be controlled, that our science is inadequate to the task, and we cannot perfect it. We feel that here is a fundamental organism of society that has ideals, made up out of selves which cannot get their adequate expression, so that they are not at home in the world in any such sense as the physiological and physical organisms are. It is natural then to demand a different world where this discrepancy is not found. Of course, that is the assumption that has lain behind all religion. We look, then, for some power outside the world if we are going to reach the type of goal which social selves require.

3. Human society is not at home in the world because it is trying to change that world and change itself, and, so long as it has failed to so change itself and change its world, it is not at home in it as the physiological and physical mechanism is. There is a need for salvation—not the salvation of the individual but the salvation of the self as a social being. I think that side of it rather than the mystic attitude is of greatest importance. There are also present religious experiences. Our religious experiences come back to that possibility of the development of society so as to realize those values which belong to social beings.

4. Consider the demand of the individual for a continued existence, an attitude which varies with individuals. It is a question whether this need cannot be resolved into the one just discussed: the demand for the sort of society which we feel we ought to have in order that human beings could be the sort of human beings they should be—an ideal social order, if you like.

Now, does the demand which the individual makes for a continued existence also receive its explanation here? Is the individual separable from a social order? Is not the great genius in the field of religion one who in a certain sense carries in himself a higher social order and so transcends his immediate one? When Jesus, for example, gave his conception of humanity as a single family, he was embodying in his own experience that sort of a society, in so far as it could be embodied. Apart from the instinctive love of life, is this demand for immortality any more than an assertion of the continuous character of the social value which the individual as a social being can embody in himself?

5. In the conception of salvation it is implied that we do not feel that we are in harmony with what is the real end of the universe, if there is one. We assume there are certain values which belong to the world, as such, and what we want is to line ourselves up with them. In general, the assumption that has lain behind religion is that of a moral purpose in the universe; and, where we speak of salvation, we assume that the individual brings his own life in line with this purpose. Such is the way religion has expressed itself in the life of man. It is assumed that there is some essential moral process, a certain movement toward some end in the universe with which our own purpose ought to be aligned; and, in so far as the individual feels that he accomplishes this, he has the sense of salvation.

6. The desire to get a feeling of at-homeness in the world, and the assumption that the universe as a whole has the same sort of value that the individual has, can be further interpreted. What do the combined desire and assumption mean to us? If they have a value, it lies in our immediate experience and has a definite function of some sort in that experience. It has been a value which has been most prominent when social changes were taking place. The demand for salvation, where it swept over mankind as a whole, has gone along with the necessity of great social change. It is part of that experience. My suggestion is that the value of these experiences, so far as they are values that enter into life, has to do with our relationship to our social en-

vironment, with our effort to realize there those values of importance and to conserve them. The mystical experiences which may be, of course, very widely felt in terms of excitement are really the sense of the relation of man to his society. He brings himself into relationship with that society and brings society itself into such a form that the proper relationship may be itself set up again.

It is a question, then, of the interpretation of exactly what this value is. I think a third possibility should be brought in. We can take the agnostic attitude that we have no way of finding out what our relation to the universe as a whole is. Or we can take religious experiences as having an import and accept them as a means of bringing out the meaning of life. The third suggestion is that these experiences themselves, the value experiences, can be conceivably analyzed and brought back to the relation which we have to society as a whole, especially when we recognize that that society is itself changing, and when we recognize that its values are in the process of development and that what we are seeking for is a connection between our own value experiences and that social whole to which we belong.

7. Is it necessary that that feeling of unity or solidarity should go beyond the society itself to the physical universe which seems to support it? There is no way at the present time that we can with any security connect the history of man and the values which have appeared in society with the history of the physical universe.

XXVII

BACK OF OUR MINDS

I AM not now using the term "mind" in a technical sense. I refer to the meanings and values which things have for us and the responses they call out. I refer to such expressions as "I have this or that idea of the affair," or "This is what it means to me." If a man looks at the heavens and has an idea that it will rain, he takes a raincoat, and we locate that idea in his mind; or, if he spends a goodly sum of money on a first edition of Samuel Johnson's *Rasselas*, we place that valuation in his mind. Our minds contain our immediate reasons and grounds for our conduct, that is, our reasons and grounds as they appear to ourselves.

Freud has made a great play of showing that the reasons and grounds which lie in our minds for many of our acts are not the real reasons and grounds, and he is seldom satisfied if he does not find the real reasons in thwarted sexual impulses. But, apart from Freud's predominant reference to sex in the matter, there is no great novelty in this recognition that there are more profound reasons for much of our conduct than those that appear to us to be explanations of our acts. To take a flagrant example: We have found our reason for eating in the dishes spread before us, while we are quite ready to recognize that these dishes have been only occasions for the exercise of a profound habit of seeking nourishment, very little of which lies in what we call our consciousness. We play golf perhaps with passion, but back of this and other fashions of recreation lie obscure demands of our physiological systems which only find occasions for their expression in the games. The young man falls desperately in love with a very specific young woman, but back of it lies the great process of reproduction of the species.

The good reasons for which we act and by which we account for our actions are not the real reasons.

And then there are the profound social habits which make our societies possible that find their expression in buying and selling, in voting and seeking political offices, in herding together in clubs and churches and nations, and which only find their occasions for our conduct in specific stimulations that appear to us to be the good and sufficient reasons for what we do and refuse to do.

There is no great importance in this distinction between these profound biological and social processes and habits, on the one side, and the specific occasions that, under the ordinary conditions of daily life, give them their expression, on the other, unless these underlying impulses get tied up in the forms of so-called complexes, and it becomes important for the physical and psychical health of an individual to distinguish between the good reason and the real reason for his conduct. When, however, there has been a considerable change in the social situation, these former cues and occasions for conduct fail to answer to the impulses and processes they should serve, and uneasiness and friction arise which we are often unable to understand. There is a failure to connect between the underlying changing attitudes and our minds with their definite ideas and values that should give them expression. The difficulty lies especially in the fact that the accepted ideas and valuations of things keep the old habitual responses in action, while the changing attitudes find only unfitting occasions for their expression. Our minds—in the sense in which I have been using the term—fall behind the profound development that is taking place underneath. Of course, there is more here than the mere misfit of the social process and the idea of the thing in which it finds its expression. There is the conflict between the old and the new, between the radical and the conservative; but this conflict becomes unintelligent because we are unable to find appropriate cues and occasions for its expression. We may not wish to be either radical or conservative. We may wish to comprehend

and to do justice to the changing valuations. Under such conditions it is worth while to bring to as clear light as we can that which is taking place underneath. I have in mind three profound changes which have been going on in recent years and which fail to fit satisfactorily into customary ideas and valuations: those growing out of the World War, out of the extraordinary development of recent science, and out of the scientific control of biological life.

I hope it is clear from my approach that I am not undertaking to discuss American adherence to the League of Nations, or relativity, or birth control in order to indicate certain contentious questions which these topics will at once suggest. What I want to do is to set off against the unquestioned reconstruction of the world, along with our consequent attitudes toward it, the ideas which we commonly use in reacting to the world.

The change brought about by the World War that I have in mind is the definite abandonment of war, except in case of defense, as a legitimate measure of national policy. The practically universal acceptance of the peace pact is the adequate evidence for this fundamental change. Of course, the definition of a defensive war and of national honor and of peculiar interests indicate how far we are from carrying over the fundamental attitude into practical measures of international life, but that the peoples of the Western world have realized that this international life is so genuine that the differences between nations may be settled in ways other than by fighting and that these other methods should be found and used, is, I think, beyond doubt. War, even a world war, is still an ominous danger; but it is no longer unthinkable that it should be abandoned, and, if it can be, it certainly ought to be eliminated. The arbitrament of the god of battles is an indefensible court of appeal between intelligent nations, so far as the settlement of differences of interest is concerned. Of course, if we were attacked, we would fight—and fight to the last man and the last gun—but the country has subscribed to President Wilson's affirmation that the times were past when the people of the United States would

enter upon a war to win another square foot of territory. We have been deeply gratified that we have settled our fishery quarrels with Canada—and the Alaska boundary dispute—by arbitration. We feel that we have been acting as self-respecting gentlemen in demanding only what are recognized as our rights among the peoples of the earth and being willing to abide by a decision of impartial judges of those rights. The procedure has increased our self-respect, not diminished it. If Japan should demand that we admit her nationals as immigrants, we would feel that she was undertaking to settle for us our home policies; and, if she went to war about it, we would regard her as an aggressor and our war as a war of defense, and the community of nations would assent. But, if an issue arose over the Monroe Doctrine, we would suddenly find ourselves in another universe of discourse. Nobody knows what the Monroe Doctrine is. It is a policy that was initiated in the interest of the South and Central American communities, but today it is almost unanimously denounced by these very communities. We cannot say that the issue involved in the Monroe Doctrine is that we are unwilling to have neighbors on this hemisphere who belong to European communities, since the undefended continent-wide boundary between the United States and Canada is the only boundary, I think, in the whole wide world which, during the century and more since its establishment, has not been crossed by hostile forces. No, the Monroe Doctrine is a question of national honor. We are all of one mind about it because there cannot be two minds about something which no one understands. It is an ideal instance of the issues for which nations fight at the drop of the hat, and our chests expand when we feel that we would as a nation go to the mat for something that we are unwilling to discuss.

I think this an excellent illustration of a profound social reconstruction that is taking place back of our minds; while in our minds we do not as yet find the cues which answer to this new ordering of social relations. We must in some way be able to assert our national self-respect. In some instances we can do

this, in courts of arbitration or other international bodies, but back of these lies a something that we have no other means of affirming except by a willingness to fight, not because we want to fight, or because we hold other nations in hate, but because unless we are willing to stake everything upon some cause, of which we ourselves are the sole judges, we would not hold our own national self-respect nor would we feel that we could command the respect of other peoples in the community of nations to which we belong. For this purpose we set up national honor. It may be aroused by the Monroe Doctrine or by the Panama Canal or by an insult to the flag. The important point is that, whatever the cue to fighting may be, we will ourselves determine whether or not our honor is impugned. There must be some symbol that we will not submit to the estimation of anyone. Now, as long as war is regarded as a legitimate method of settling differences among nations, this is inevitable because no one but yourself can decide upon what you will stake your very existence and because in war all standards are in abeyance—witness the use of gas and the submarine in the World War. But this attitude is not physiologically or socially essential to the preservation of self-respect. Our personal self-respect is closer to us than our national self-respect, but we have long ago dropped the duel as an institution essential to a gentleman. Our minds have fallen behind the social development that is back of them. If a war of aggression is a crime, one cannot absolve a war for national honor from the same stigma, except by the confession that our minds are unequal to the task of finding out what it is in which national honor consists. If it has any rational content, it is capable of being impartially judged. Our mental processes have lagged behind the advancing world within which they should function. As long as fighting is an accepted method of international intercourse, national honor is essential to keeping up the fighting spirit, just as chivalry was a natural psychological incident of feudalism. If war is not only a criminal but a stupid method of settling national differences of interest, the sort of fighting spirit that is signified by national

honor is as really out of date as the knight errant and the duel. But we cannot, as yet, think of ourselves as a self-respecting nation without feeling ourselves ready to fight for grounds of which we ourselves will be the sole censors. Our intellectual processes have not caught up with the growth of international society.

Let us consider another illustration of the same mental lag—that for which the growth of the modern sciences is responsible. I am not referring to the inability of the man in the street to comprehend the intricate methods and findings of recondite physical science. The mental lag I have in mind may affect the scientist quite as much as it affects the layman. What I refer to is the finding of the meaning of the world in the historical account of it, and I refer, of course, to its meaning to us. The outstanding case of it is presented in the philosophy of history to be already found in the New Testament epistles, which interpreted the Pauline Christology in a history that went back through the chronicles of the chosen people to the Garden of Eden and the creation of the world. This philosophy of history was sharply formulated by Augustine, as from the northern coasts of Africa he watched the fall of Rome to the conquering Goths, and lifted the church out of the crumbling Empire as God's chosen instrument for the accomplishment of His purpose. The form in which we are most familiar with this philosophy of history is in the height of that great argument in which Milton undertook to assert eternal providence and justify the ways of God to men. I am not interested in any particular form of this philosophy of history. We may utterly neglect the Pauline Christology and the Augustinian doctrine of the church and the Miltonic councils of the Trinity and still assume that we can interpret the meaning of the world for us in its history. The scientist occupied the attitude as truly as the churchman when Bishop Wilberforce asked Thomas Huxley on which side of his family he traced his descent from the apes, and Huxley replied that he would rather trace his descent from an ape than from a bishop; and the case has been tried more recently in the

courts of the state of Tennessee. The scientists were quite as ready as the churchmen to believe that the meaning of man's life on earth was to be found in his past history. It was a combat of histories.

Take another illustration: Entropy and the second thermodynamic law indicate that, instead of the history of the universe moving toward some far-off divine event, its goal is to be found in a dismal twilight of creation in which energy can do no more work but is evenly distributed in entire meaninglessness. Professor Millikan does not like this picture because it seems to take the meaning out of the present, and he has suggested that the cosmic rays, which he has so brilliantly investigated, may be expressions of energy which build up again the atom and so build up again the star, and thus set the whole process in operation again and again. And Jeans, the eminent English astronomer and astrophysicist, in his comment on Professor Millikan's suggestion, says that for his part he would rather see the universe running down than endlessly repeating itself. In either case the scientist is interpreting the universe in terms of its history. It is not as scientists that either of these men make their comments, for each of them knows that research science is quite as busy discovering new histories of the universe as in discovering new elements and processes in the present. When the spectroscopist adds or subtracts a billion light years to or from the history of stellar bodies by noting minimal differences in the positions of spectral lines, he knows that a later investigator will reconstruct his history of the universe in reconstructing his scientific theory. For our science is a research science and a science of discovery in a universe so interrelated in its events and phases that every advance means a new history. We interpret the past by the present as really as we interpret the present by the past. The new history of the stellar universe, which Eddington and Jeans have spread before us, is simply the building-out of their hypotheses of atomic processes and stellar structures. A new hypothesis will inevitably present us with a new history. Nor are such thoroughgoing reconstructions of his-

tory confined to stellar ages. The last authoritative commentary on the Gospel of John presents it as a dramatic treatment of the life of Jesus under the influence of Alexandrian gnosticism and Pauline Christology, by the pupil of the Witness, who was a younger follower of the Apostles—the author being the teacher of Polycarp and writing probably in Ephesus at the end of the first century of the Christian era. The historical reconstruction of the Gospel of the Beloved Disciple is as logical an outcome of the scientific criticism of sources and monuments as Eddington's account of what has been going on in the interior of the sun during the last billion years is the logical outcome of the theory of the expenditure of the sun's energy and the structure and process of the atom. If our scientific historians did not rewrite human history, they would be writing themselves down as incompetent research men. It is not necessary to elaborate what sticks out of all the work of modern science and has placed the works of scientists who command a good English style among our best sellers.

But the moral of it, while close at hand, is not so readily drawn. The moral is that we cannot interpret the meaning of our present through the history of the past because we must reconstruct that history through the study of the present. It is fairly evident that we cannot find the meaning of human life on the earth in the present-day history of the earth. With Bishop Usher's chronology on the margin of the Bible and the Pauline philosophy of history we could. Yet we are unwilling to surrender this method of exegesis. When evolution presented another history of man, certain social theorists found the meaning of human society in the law of the survival of the fittest in the struggle for existence—and appealed to nature against our philanthropies which preserve and propagate the unfit. To take another illustration: When Marxian socialism became a dogmatic system, the economic interpretation of history became as rigid a part of their orthodoxy as the historicity of the Bible record had been in church doctrine. The furor that has been raised over history textbooks in our schools, with the

demand that the children should find the accepted meanings of our institutions displayed in the histories of their country, is another illustration. We want security in our institutions, and so we look for their natures in the immutable past. But unfortunately the past is not immutable; each generation re-writes its history. So the legalists of the generation of Webster and Hayne fought over the historical interpretation of the wording of the Constitution, while the real question whether an institution such as slavery, which irrevocably divided North and South, could remain in a nation that was one and indivisible came to final decision on the battlefield. Von Treitschke sought in German history and Mommsen in Roman history for stable foundations for the *Machtpolitik* of a Prussian state embodied by Bismarck in a German empire, but the answer to the challenge of militant imperialism was found not in history but in the judgment of the World War. It is not in a historical tradition that we can find the answer to our social problems. We have got to think them out in terms of the present. Historical data present some of the conditions for their solution, but they do not carry their solutions with them. That is, we cannot find the meaning of the world or of our societies and their institutions in a process we can trace in the past leading up to a goal which we can descry in the future. This has been our method of understanding the world. The plan of salvation as we find it in *Paradise Lost* was the philosophy of the average man for centuries, and we have substituted evolution for the biblical account but retained the framework. The meaning of the world must be some end toward which we can trace the movement of events in the historical past. Herbert Spencer presented it in his philosophy, and Tennyson sang it. Whatever faith of this sort we may carry in our souls, it has ceased to be an intellectual fabric within which we can state our problems if we wish to solve them intelligently. There is no vision given on the mount in any historical past that works out the steps we are to take to reach the solution of our problem. By the very achievement of the sciences we are thrown back on the method of the sciences—and

this method is one that is continually reconstructing its world and therefore its history. It is in the social problems that we have as yet difficulty in making use of this method. We cannot approach the questions of property, of the family, or of the criminal without assuming a proper order which the history of the past reveals to us. Let me bring out the difference in a procedure within a social problem in which we have in a measure made use of scientific method. I refer to the juvenile court. In the case of the juvenile offender the court may undertake to discover the reasons for the child's delinquency. Parents, schoolteachers, social workers, neighbors, probation officers, as well as those affected by the child's misconduct, may all be called in not so much to find out whether a certain criminal act has been committed but to find out why the child is derelict and to work out some hypothesis of a reconstruction of the child's social situation which may change his habits and attitudes. The procedure is that of the physician and health officer in seeking to check a disease. There is no law of evidence. Everything that can make the situation comprehensible is welcome, and any course that will bring the child back into normal conduct is allowed. In the court to which the adult criminal is brought, crime is defined by a historical institution, with values that have been previously fixed by legislation. The problem is to give the act its proper definition under the terms of an enacted statute and then punish it according to a gradation of penalties which the institution of criminal justice has approved. Only in *Erewhon* would we proceed in this fashion with the sick. We call our punishments means of repressing crime, but we would be unwilling to test them scientifically and substitute entirely different methods of checking crime if they could be found. Retributive justice has a sanction which is too deeply imbedded in our past to be abandoned. We are as yet unable to approach the discovery of what crime is, as we seek the cause of measles or of cancer. Our institutionalized past has determined for us what they are. As, however, in the juvenile court the other method appears, so we find in dealing with divorce,

with public utilities, this approach indicated if not adopted, that is, we undertake to find out what the values are in present experience and abandon the time-honored definitions. But the situation is so complex and difficult that the intellectual lag promises to be long in correction.

My final illustration is found in the biological sciences. All species in some sense control their environments. The world that surrounds them is in some degree different from what it would be if they were not there, and this difference has something to do with their success or failure in accomplishing the adventure of life. But it has been left to man to attain the largest control over the environment, to determine the biological and physical conditions which render life possible for the human species, and to fix the conditions which may change the character of the human animal.

We have generally assumed that climate (that is, the incidence of heat and cold upon the dermal surfaces of animal forms), the geographical locus of a species, the food supply both animal and vegetable, the variety of matings, and the exposure to enemies, macroscopical and microscopical, have been the influences that have determined the prevalence and disappearance of living forms on the surface of the earth and to have been in no small measure the causes or occasions for the appearance of new species. These would not, of course, account for mutations, but some suggestions of the physiological processes by which these may have taken place appear in studies in the influence of radiation upon germ plasm. Now the human species has attained the possibility of the control over all these factors. By change of habitat, but principally by the use of clothing, we can determine what the incidence of heat and cold shall be upon man. We can live in any locality, even in the Antarctic. We can adjust ourselves to all types of geographical surroundings—man is at home on mountain or plain, on islands or on continents, in the desert or in the fruitful river valleys. Man has geographically conquered the earth. He can determine what vegetation shall surround him, wipe out primeval forests, and reforest the land. He plants

what crops he wishes, and the cattle upon a thousand hills are his. If dangerous foes still exist in forest and jungle or lurk in the caves of the earth, it is by his good will. At present he is carrying on a winning battle with his most insidious enemies, the microorganisms. It rests with him to determine what pressures of population shall arise or subside. Biologically he is at liberty to breed the best strains, and he is busily at work determining what the heritable characteristics are for which he may wish to breed his own kind. He is pushing his study of the social conditions which determine the psychological health of the community. He can envisage the principal influences which affect for good or ill the life of human communities, and in great measure these are, or promise to be, under the control of the community. His societies are not, as in the case of the insect societies, limited by physiological differentiation. Social differentiation is the function of what we call mental life, that is, each individual carries in his mental apparatus the social structure of which he is a part, through the symbols which answer to all the varied responses of those with whom he co-operates in the complexities of our communities; and behavioristic psychology is bringing this highest phase of organization among the members of the species within the pale of scientific contemplation and possible control.

The development, on the one hand, of the biological and social sciences and, on the other, of social organization, has brought human society to the point at which it may ultimately control the conditions that presumably determine human misery, disease, surplus population, and the propagation of undesirable types. We cannot eliminate earthquakes or hurricanes or cyclones, but we can conceivably learn to live with them or avoid them. Now I am not so silly as to suppose that, if we were simply willing to be intelligent, we could in the immediate future solve any of these fundamental social problems. What I would call to your attention is that we have fundamentally different methods of stating the problems and that the ideas

ich belong to one statement do not fit in with the others. Let : refer again to crime, by way of illustration. We can state s as a problem of getting rid of crime and ask what are the aracteristics of the criminal, if there are such characteristics, d what are the social conditions which lead to crime, and then would seek to breed out those characteristics if they exist; t as there are probably no specific criminal characters, the erest would turn to the control of the conditions which breed minals, and the most sensible method of dealing with actual minals with a view to making them socially normal citizens d of isolating those who cannot be so brought back into the ial order. On the other hand, we have the institution of re- butive justice which, as John Stuart Mill showed, goes back an attitude of vengeance. We are at liberty to inflict suffering on the criminal because of his transgression. The satisfaction this impulse, however wholesome we may think it is in the ression of crime, belongs to a different universe of discourse m that of the control of crime by control of the conditions t of which it arises. The two sets of ideas do not cover each ier. For example, you hear the sociologist abused as a dan- ous sentimentalist when he recommends a consistent system paroling offenders, while he becomes an inhuman monster if recommends sterilizing hopelessly degenerate stocks.

Again I wish to emphasize that I am not recommending a ain procedure but that I am only pointing out that ideas uch we entertain of crime, owing to the traditional punish- nt of the criminal, do not fit in with the attempt to control e conditions which are responsible for the origin of the crim- ul or the fixing of his criminal habits thereafter, and naturally ough the two methods do not combine very satisfactorily. I have indicated above that it is possible at present to ap- ach all our serious social problems from the standpoint of e control of the conditions which determine the problems. us has not presented us as yet with definitive solutions of ese problems, except perhaps in the field of disease, where

some notable triumphs have been obtained, but it has given us new statements of the problems which are of the greatest importance; and the ideas in our minds which spring from our traditional institutional responses, as a rule, lag behind the attempt to approach them in this other fashion which may be called "scientific." I think a definite plea may be made for the sort of intelligence which recognizes this natural and necessary lag. I assume that we would all agree that, in the presence of an evil which we wish to remove, the intelligent attitude is that of discovering the conditions out of which the evil springs and undertaking to control these conditions; and I have been indicating, in indeed a cursory manner, that human society has never been able in the past to make so intelligent an approach to problems as it is today, and that the most serious obstacle to this sort of intelligence lies in the failure of traditional ideas lying in our minds to fit in with the statement of the problem in terms of controlling conditions. The solutions of these problems is far ahead of us in any case, but there is no reason for putting it still farther off by an unwillingness to recognize the source and function of our ideas.

I have sought to exhibit three different phases of the world that lie back of our minds, with which I think we can pretty plainly recognize that our ideas fail to connect. Being willing to fight for a reason which we are unwilling to discuss should no longer be necessary to achieve a sense of national self-respect, that is, to realize our solidarity as a nation; and international society has so far progressed that we admit that war as a method of national policy is no longer legitimate, and yet we still keep the idea of national honor as an allowable *casus belli*.

We live in a universe whose past changes with every considerable change in our scientific account of it, and yet we are prone to look for the meaning of our biological and social life in fixed forms of historical institutions and the order of past events. We prefer to understand the family, the state, the church, and the school by forms which history has given to

their social structures rather than by finding the meaning of the history of the institutions in the functions and services which our social science exhibits.

And, finally, while biological science has shown us that human beings can control in large measure the conditions which determine their physiological and social life, we still hesitate to state our problems in terms of these conditions because of the fear of weakening or invalidating old values which are consecrated by the past, and because of the responsibility which the new statement of the problem carries with it.

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XXVIII

EXPERIMENTALISM AS A PHILOSOPHY OF HISTORY

ANTHROPOLOGY within very recent years has unearthed remains of human beings, their implements, and their habitats which it has been able to so relate to one another that they present a strange prologue to the history by which we interpret our conduct. Using the clock which geology offers for timing the changes that have embodied themselves in earth strata, anthropology has stretched the history of man on the earth back hundreds of thousands of years. What we call history, the records which men have wittingly transcribed, may be carried back some four or five or six thousands of years B.C. First in the valley of the Nile, or that of the Tigris and the Euphrates, or perhaps in China, the events in the heavens and the achievements of monarchs were transcribed on stone or bricks for later men to read. By looking into the future, society acquired a history. Spaced against the aeons of prehistoric man the historic period dwindles into an insignificant moment. To be somewhat more specific, consider the Cro-Magnons of the Upper Paleolithic period. The anthropologist has identified the tools of his hand and his manner of using them, particularly he has found caves that have been for ages sealed from light and the outer air, which in his day the Cro-Magnon frescoed with extraordinary portraits of animals of his period. The colors are still fresh, and the representation of posture and motion is characterized by great vivacity. There is likelihood in the suggestion that these caves were the scenes of the performance of their cults. They must have lived in small hunting groups, killing some animals, but probably feasting like jackals on the killings of other animals when these were surfeited, or on

animals who had died from other causes. A few skeletons of these Cro-Magnons have been found, and if it is legitimate to judge the race from these, they were of more than the average stature of the modern European races, and they had larger brains.

The period in which they inhabited Europe was one in which the icecap of a glacial epoch was slowly retreating to the north. The anthropologist reckons the length of the life of this race as twenty-five thousand years. Here was a race, possibly better than our own, inhabiting what was to be the center of Western civilization for a period more than five times as long as the whole of recorded history, who never got far beyond the life of the animals that they trailed. Anatole France need not have fashioned his *Isle of the Penguins* to satirize the philosophy of history of church doctrine, or such a version of Augustine's philosophy as lies in the back of the minds of most of us. What is the value of the effort and suffering of innumerable human souls through twenty-five thousand years? Into what sort of a picture of human values in a rational universe can we fit the episode of the Cro-Magnons? And they constituted but an episode in the many hundred thousand years of humanity. Is all the meaning of the race crowded into a few thousand years within which so-called civilization has flourished?

Some sort of a philosophy of history we do carry about in the back of our heads. Even the scientifically tough-minded men must recognize that values have arisen in the universe as genuinely as molecules or galaxies or the tides of the seas. They belong, to be sure, to the perspectives of human society, but there is no aspect of the universe that is not a perspective, and the tough-minded scientist is the last person who can deny that the human perspective belongs to the universe of science, for his toughness consists in denying any transcendence of man above his habitat. The medieval philosophy of history saw in the physical world the scene on which was enacted the fall and salvation of man for the greater glory of God. The final culmination lay in the world to come. Since the Renaissance, with

the background of the thought of Francis Bacon, the Western world has been slowly bringing that culmination to earth. We have surrendered the *Civitas Dei*, with its streets of gold and its gates of precious stones. We do not know where we are going, but we are on the way. In the sense of progress we have a philosophy of history that is as genuine as the plan of salvation of Milton.

But, if we cannot scale the Delectable Mountains and discern even through a glass darkly the goal of our upward struggle, we can and must look backward and map the land which we have traversed. It is through our backsights that we gain the course that we have to follow day by day.

The features which these values assume as we look back at them are those of social institutions, monuments, and products. Liberals in politics trace back the growth of popular government through the changes in institutions of social control, of economic process, of means of communication, and public enlightenment. Educationalists follow the history of the schools from those of the church to the university with its humanities and experimental science, from those of the counting-house to common elementary schools with compulsory attendance. Religionists pursue the history of doctrine from the dogma to the creed and from the creed to the recognition of the social import of the cult. The retrospect of history formulates the values in the institutions that have embodied them and gives us a sense of the direction which their evolution is taking. The mere recitation of these essential social institutions exhibits their vital relationship with one another. The history of society has displayed them differentiating themselves out of the social habits in which they were operative in function, if not present in structure. No one institution could stand by itself, and the development of each one of them has been the outcome of the processes of all of them. The church, which has incarnated absolute authority, has also carried in its schisms the banner of political liberty. Philosophy and science have demanded freedom as the price of their existence, and political revolutions

have sprung from the universities. On the other hand, the only society in which any one of them could thrive and advance has been that characterized by the reign of law and the sense of political responsibility.

At times we look back with a certain nostalgia to the thirteenth century, when all the values which these institutions have enshrined could be contemplated as but the phases of a single *summum bonum*, the glory of God. Everything, including our values, was placed with such ideal neatness in the *Summa* of a Thomas Aquinas. But, beside the condemnation of this dogma which has been pronounced by one revolution after another, there arise all the multitude of the Cro-Magnons through twenty-five thousand years of their earthly existence to stare it out of countenance. Since this flowering period of medievalism each value has at times asserted itself in jealous detachment from all others. Religion has gone its sectarian way spurning establishment. Art for art's sake rejects all moral or social judgments. An abstruse spirit of scientific research can rejoice that the products of its labor may be of no possible use to anyone, and the school demands that it be freed from politics. But, if the institutions that invest these values have always been and continue to be inextricably involved in one another, it can hardly be otherwise than that the values themselves involve one another and in some fashion belong to a common good. Such a sum of common values may be called "public welfare," but it seems to be mainly the fact that art, and health, and public security, and play, and enlightenment, and science, and other goods may belong to a single community that is responsible for their being assembled as public welfare. It is an additive *summum bonum*, not an organic whole of which these different values are but aspects. At times the conservative decries enlightenment, and the idealistic revolutionary undermines public security; the aesthete contemns morality, and the moralist denounces art; the religionist assails science, while the highly trained analytical mind denies that there is or can be any positive good of any sort.

These, then, are the two sides of the problem of values. Each social institution with the good that it subtends asserts and maintains itself but finds itself in that assertion in conflict with other institutions and their goods. It is important to notice that, apart from the skeptic, the representative of one institution who finds himself in opposition to the representative of another, for example, the enlightened scholar criticizing the practical politician, does not deny the good which the other represents. He undertakes to give it a more adequate statement from his own point of view.

Unless men simply run amuck, the most peremptory assertion of their cherished goods is a demand for a world in which the competing goods shall have their proper place with due recognition of those in the interest of which they are fighting. A human community there must be, and there can be no human community unless it recognizes the values that are the goals of its strivings. As it is possible to find all the essential physiological processes of the most complex animal form in the life-process of an amoeba, so we can discover in a primitive community all the functions that answer to the structures of highly elaborated institutions in complex societies, and these functions must persist even if the values which the institutions mediate find themselves in conflict.

There have arisen social sciences correlative to these institutions. Answering to political institutions stands political science, to economic institutions, economics, and so on through the list of social institutions. In recent years another discipline emerged, that of sociology. Both its definition and its procedure are uncertain. It approaches nearer to a physiology of the social process than to the anatomy of social institutions. It is interested in the sociality that finds its expression in institutions and their functions, and it is particularly interested in this sociality as an expression of the experience of the individual; it has a special affinity, therefore, with social psychology. There is no situation in the field of political science or economics or education which cannot be approached by the sociologist. His

science is in this sense a more general one than that of the other social sciences; and yet, when the problem of the conflict of values arises, it is not the sociologist who provides the interpretation which we feel such a problem demands. There are disciplines that deal specifically with values. Logic is occupied with truth values, aesthetics with aesthetic values, and ethics with moral values. Each within its field undertakes to determine the process by which the conflicts of its values should be resolved, but no one of them has control over all the material which is apt for the adequate interpretation of the strife between essential values which so largely occupies our attention.

But it is more convincing as well as more grateful to present this in an example, and let the example be that of the problem of eugenics. Shall society deliberately breed men in accordance with the laws of heredity, as it breeds sweet peas, and wheat and potatoes, and pouter pigeons and dancing mice and beef cattle?

Biology states the problem as that of the possible isolation of transmissible characters. The human animal that is to be bred is to be a compound of certain characters. Supposing that we know what are the characters that we want in the future race, are these characters Mendelian unit characters, or combinations of such unit characters? Biology cannot define the characters that are desired in the human being, nor can biology define the characters that a rancher in southwestern Arizona desires in his cattle. When the biologist learns that it is drought resistance that the rancher wants, he may be able to demonstrate that the Hereford cattle have this power as the consequence of a persistent group of unit characters; but he cannot, because of his acquaintance with the laws and mechanism of inheritance, define the values that we wish to see embodied in later generations.

Psychology is making recognizable progress in analyzing traits and defining types and in discovering some of the groups of characteristics that are heritable. It is unraveling some of the complex groups of acquirements that have passed as intelligence and is beginning to distinguish different forms of intelligence. In this respect psychology is doing for the social human animal

what the biologist and cattleman does for cattle—isolating traits and their combinations, distinguishing what are heritable and what acquired—but psychology would have no title to speak authoritatively on the question as to what sort of men society should breed, nor on how the conflict of values which any policy of eugenics would arouse should be resolved.

Sociology would presumably approach the problem of eugenics from the standpoint of the study of different types of social processes, and that in man which these processes express. No more than the psychologist could the sociologist decide what sort of men society should breed, nor can sociology marshal the goods of the community in such a fashion that they will interpret one another in men's minds when a law in the interest of eugenics is to be enacted or rejected.

But is not this exactly the province of ethics? It has been defined as the science of values in so far as these influence authoritative action. A presentation here of current discussion of the field and function of ethics would be misplaced. We can only consider it from the two standpoints from which men are accustomed to regard it, as the theory either of the good or of the standard which should decide action. But the inadequacy of such a statement is evident. Such an ethics considers values only after their relation to one another in social conduct has been defined. They are already moral goods before ethics approaches them. For this reason the artist has denied that the moralist's writ runs in the field of his creations, and the statesman has averred that he has recognized no categorical imperative. But we want not conformity; we want a new form. We are not content with the light from the old lamps; we want new lamps for old. It is a question of remaking our goods, not of conserving them. It is not an affair of obedience or disobedience to law but the evolution of a new standard. Specifically, what manner of men should we breed? And more specifically still, does it seem desirable to take the implied physiological and social steps to procreate them?

Each of these sciences, the biological, the psychological, and

the social, defines a value which we experience in terms of the conditions under which it can be secured. Biology defines health in terms of foods, vitamins, the elasticity of the walls of our arteries, the selection of right parents and grandparents, and the like. Health as a value is enjoyed; it is not analytically known. Psychology defines intelligence in terms of delayed responses, discrimination of characters in objects of perception, the syntheses of these characters that make possible the reorganization of the habitual responses, and the like. Intelligence as a value is exercised in dodging automobiles and in inventing self-starters and excuses for not meeting people who bore us.

Political science defines self-government in terms of primaries, the commission form of municipal government, the cost-unit reporting of municipal administration, and the like. Self-government as a value is experienced in the realization of one's self as a power in a political campaign whose issues are dear to one's heart. Economics defines wealth in terms of exchange, production, distribution, supply and demand, and the like. Wealth as a value is enjoyed as power to consume, to assist, and as social prestige.

Granting that there is no question about the value of health, the medical man can tell us authoritatively how we ought to live and is justified in describing a man's manner of eating as digging his grave with his teeth; but the physicians who assured Milton that he would lose the sight of his remaining eye if he continued his polemical defense of the Puritan Revolution could not decide for him whether he should make this last sacrifice for a lost cause. The scientists are experts who may be able to instruct us in achieving our hearts' desires or in fleeing from what we dread, but there is no scientist who can instruct us in remaking our hearts' desires when we are burdened with the mystery of all this weary and unintelligible world. So there is no definitive scientific statement of what sort of men, or in other words, what sort of life, ought to be bred upon this earth, nor any science that by its decrees can determine whether procreation of the citizens of the state shall take place in the enjoyment of

romantic love or in obedience to the ordinances of a Platonic state.

However, it is not in such a summary disjunctive form that the problem of eugenics, or most of our problems of conflicting values, appears. The most radical eugenicists do not profess to know the breed of men that should multiply on the face of the earth, nor do their recommendations go beyond the most elementary directions for the avoidance of a few heritable evils and the characterization of desirable stocks. Putting to one side the question of the advisability of forbidding by statute unions that would be productive of imbeciles and the insane, and requiring physical examination of those seeking marriage licenses, the fundamental problem is that of remaking the attractiveness of men and women for each other so that it will include characters that at present do not enter into it. The psychologist and sociologist can give us some expert advice about the conditions under which this can be done, provided these traits have some inherent attractiveness in themselves, that is, provided they are already values.

I am referring, first of all, to the commonplace that tastes change. We know that this is the case in matters of the table, of dress, of various types of prestige in the community—and the list could be variously extended. Novel elements have entered into the beauty of landscape, of line and design in the pictorial arts; the consummatory experiences of the Elizabethan epoch, the eighteenth century, and the nineteenth century were profoundly different from one another. Historical criticism, psychology, and sociology can in a manner explain the changes which have taken place in these values, that is, they can display the conditions which were favorable to the shifting of interests and the fusion of attractive characters; but no one of them could establish itself as a master-science which is competent to determine for us what traits of people and things should attract our interest, nor what reshaping of our goods should take place. We are as profoundly ignorant of what concrete tastes our grandchildren will have in sauces, in witticisms, in sculpture and

painting, in poetry, the drama, and the novel, in morals, in social prestige, and in religion, as were our forefathers in the Elizabethan epoch.

And yet, in the second place, we know that these changes will take place in the values of our posterity, and our Elizabethan ancestors did not know it as well. We not only know that these changes will take place but know the sort of conditions that will make these changes comprehensible. We know that society is in a process of evolution, though we do not know what forms of institutions, of monuments and products, of minds or of temperaments will supervene. We know that we are on the way, though we do not know where we are going. In other words, we have a different philosophy of history from that of the medievalist or the Elizabethan. In what sense, then, does our equipment enable us to approach the problem of eugenics?

As I think I have indicated, there are two approaches to this problem. One of them starts from present unquestioned values and, setting up standards fashioned on these values, proposes social regulations that tend to restrain the reproduction of certain strains of human stocks that by these standards are undesirable. The other approach is from the reinterpretation of the situations within which our values appear and which are responsible for the cast they have taken on.

Let me illustrate the latter by birth control, one of the features in the program of eugenics. There have been two situations whose values have been largely associated with birth control in the public mind. One is that of the economic estate of the family, the *res angusta domi*, and the other that of irresponsible sexual relations between men and women. Birth control is thought of as an avoidance of economic and social burdens, or of the restraints which the institution of marriage entails. Birth control appears as an evasion of responsibilities. The reinterpretation to which I refer would relate it to the most intelligent generation and rearing of children, and to the economic and racial health of a community that is not impairing itself by overproduction. It is not necessary to elaborate the point, for

it is evident that, in so far as birth control is made a part of the most intelligent procedure in the production of the best children, it takes on the values of those children both in the family and in the community, and tends to pass under the control which the interest in such children carries with it. Such remakings of values in human society are too familiar to require further illustration. And such remakings of values take place also far below the threshold of reflective experience. If certain physical types come to take on the prestige in the community which belong to an approved breed, these characteristics may become dominant in the sexual attractiveness which men and women have for each other.

It is the new philosophy of history, that of social evolution, which opens the door to this procedure of the reinterpretation of values—a door which was forever closed to Augustine's philosophy of history, for in this all values were authoritatively defined and fixed. Where heterodoxies and schisms appeared, new definitions equally fixed were substituted for the old.

A philosophy of history arose as soon as men conceived that society was moving toward the realization of triumphant ends in some great far-off event. It became necessary to relate present conduct and transient immediate values to the ultimate values toward which all creation moved. Its earliest form was in Paul's belief in the coming of the Lord within the lifetime of his own generation. By the time of Augustine these hopes had sunk in a dateless night, and he stood in the dark and stormy dawn of the modern world lighted by the collapse of Roman society, in the fires kindled by barbarous peoples. It was in the City of God in the world to come that the achievement of the purpose of the human race was placed, and it became the task of this philosopher of history to interpret the past, the present, and the future in the light of the inspired revelation of creation's goal.

There was no philosophy of history in the Grecian or the Greco-Roman world. Its values existed fully realized, if not in the sensible world, in the supersensible world of ideas and

forms. At most Aristotle could guess at a sort of rhythm in history at the nodes of which intelligence rose to higher levels, and the Stoics conceived of a recurrence of events ceaselessly reproducing the past in the future in mighty cycles; but, if the fulfilment of values, the realization of ends, lay in the process of time, it was incumbent upon intelligence to read the history of it in the past and project it into the future in terms of present conduct. As long as the dogmas of the church held men's belief, the philosophy of history was some variant upon the plan of salvation.

When the church dogma had lost its grip on speculative thought, the Renaissance ushered in human progress through man's control over nature, and an earthly goal was pictured in Sir Thomas More's *Utopia* and in Bacon's *New Atlantis*. If dogma could be interpreted so as to allow freedom to human endeavor and to the science that gave it its technique, there was no necessary break between the goal of the church and that of human social progress. The most grandiose attempt to combine the three great motives of speculation (that of Greek contemplation, that of the church's plan of salvation, and that of experimental science) is found in Hegel's *Philosophy of History*.

Hegel presents human progress as a finite temporal process that ceaselessly advances toward a goal at infinity, the divine timeless absolute, within which it exists as a mere subjective appearance of truth in its objective reality. There were curious reverberations of Hegel's philosophy in the absolutistic theory of the Prussian state and in the economic interpretation of history of Lassalle and Karl Marx; but the supreme test of any present-day philosophy of history must be found in its interpretation of experimental science, the great tool of human progress, and here Hegel's philosophy was an almost ridiculous failure.

Only less grandiose was Herbert Spencer's philosophy of evolution. He undertook to so generalize the conception of biologic evolution that it could be made the principle of physical science, on the one hand, and of social science, on the other.

But his generalization was necessarily so abstract that it lost all meaning for the interpretation of physical science. In the field of psychology, ethics, and sociology, where it could retain the concreteness of biologic evolution, Spencer misinterpreted evolution as a process of bare adaptation. His picture of the goal of social evolution as a society in which men are completely adapted and adjusted to their physical and social environments would certainly inspire no enthusiasm of endeavor, even if it could be got into men's minds. And if, as Bergson insists, even biologic evolution is creative, then beyond doubt this is the case in social evolution. We fashion hypotheses and test them and intentionally reconstruct the institutions within which we live. The philosophy of the Augustinian type started with values authoritatively defined and enshrined in institutions. It undertook to interpret the past and present endeavor, and future achievement or defeat, in terms of the appearance of these values and their embodying institutions, of our obedience or disobedience to them, and of the consequences that attend thereon. If we accept our values in forms that are already defined, then our philosophy of history must be of the Augustinian type, however far it departs from his dogma. What Hegel and Spencer offered over and above Augustine was an account, logical in the case of Hegel and sociological in the case of Spencer, of the manner in which the formulation of a value in an institution had arisen. For example, in the conflict between immediate sexual desire and the interest of society in the care and upbringing of children it is easy to understand the appearance of an institution such as the family, in which alone is approved the satisfaction of desire on the part of those who will be responsible for the care of the children that spring from it. Now, it is one thing to present the history of the rise of the institution from the standpoint of the result attained, and another to present it as the struggle took place in the dim consciousness of innumerable individuals. It is one thing to present the Copernican hypothesis as the most satisfactory statement of planetary movements; it is another to get into the mind of Copernicus

nicus, for whom the hypothesis was largely a mathematical device. After all, Hegel and Herbert Spencer interpreted history from the standpoint of the institutionalized values of their own moments. Neither of them presented the situation in which a value or a form or an idea is arising that is not already predetermined. As is so often the case, they used the forms and institutions of their own time to interpret history.

The past is one affair when we are at grips with a problem and are seeking its solution. It is another when a solution of some sort has been reached, and the whole falls into a single story that we read in terms of a causal series. In the first case, it takes on now one sense and now another. We analyze it into one set of factors and then into another; we are seeking its meaning, endeavoring to find in it the course we should follow. In the second case, we build up a hypothesis which we test and perhaps act successfully upon, and then the problem takes the interpretation which our hypothesis places upon it; but, while we are seeking the hypothesis, our philosophy of history is of a different sort.

These, then, are the two philosophies of history, which we use when the movement of events, the implications of the past and the promise of the future, enter into our deliberations. We either accept the meanings of our ends and purposes, as they are written in the structure of the institutions of the present, and study to preserve these values in whatever reshaping of events and things takes place. If these values are fixed, the goal toward which evolution or progress moves is fixed, and we may struggle to glimpse it in the imperfections of the present. To recur to the illustration of eugenics, from the standpoint of the Augustinian type of the philosophy of history, we are likely to picture a society of men and children that comes up to the norms which biology, psychology, and present social theory present to us, and fashion a program of the selection of types by which to breed such human animals, and of the social norms to be fostered and enforced which would insure the desired institutions. Another illustration of the same attitude is found in the program of so-

cial democracy, in Germany, presented a generation ago. In no little detail this gospel according to Marx delineated the new social order that was to obtain when the great economic revolution had taken place. The communists in Russia have sought to realize it today, though in all the great industrial societies of the world socialistic thought and endeavor have turned from it to a program that has been depreciatingly called opportunistic. Actually these socialistic philosophers realize that there is no vision of a New Jerusalem on earth given on the economic mount that can intelligently guide present conduct. They have wittingly or unwittingly turned to another philosophy of history.

This other philosophy of history is the philosophy of a society that is not only as much as but more at home on the earth than any other species of life that has existed here, for it has gradually become aware of the method of meeting its problems, the method of reconstructing its environment and itself. The method is that of experimental science, by means of which men change the environment within which society exists, and the forms and institutions of society itself. A new sort of agriculture alters the vegetable environment. A new method of conserving the temperature of the body gives the community otherwise impossible surroundings. Means of transportation enable men to live in deserts and crowd themselves into regions that could not otherwise feed them.

And *pari passu* have arisen the changes in human institutions which have made these changes in the environment possible. What by the slow process of hundreds of thousands of years has taken place in the origin and development of species of plants and animals proceeds with astounding rapidity when the process of evolution has passed under the control of social reason. As a set of means it takes on the forms of the various physical, biological, and social sciences. As a philosophy it enables us to formulate the new values which at each transition determine what changes we will seek to bring about.

Again we can turn to eugenics for an example. The values

that have determined the begetting and bearing and rearing of children have been those involved in the attraction of men and women for each other and the desire for and love of children within the family which society establishes. The decrease in the death-rate, the access to increased food supplies, the triumph over hostile climatic conditions, and the vastly increased mobility of populations have presented the problem of the overproduction of humanity, while biology and psychology have indicated valuable traits and types which could with intelligent selection be encouraged and rendered permanent. As I have indicated, we do not know what sort of society or what sort of men are ultimately desirable. We can only feel our way in finding out what is desirable. Now, that may be done in a haphazard fashion or it may be done in a systematic procedure.

The first step in a systematic procedure has, since the day of Aristotle's *Metaphysics*, been the considerate statement of the problem; and the problem as it appears to me may be stated as follows: What are the implications for present conduct of the discovery of biological and social science that the human community on earth can by taking thought determine what characters of its individuals are heritable, and by selecting them and favoring their propagation change itself by changing the individuals?

This does not imply that society will or should adopt a program of producing a community of perfect biological and psychological individuals. All that is implied in this regard is that in facing our social problems we have a new technique which should be taken into account. We are beginning to take it into account, for example, in the discouragement through public opinion and legislation of the breeding of imbeciles and the insane. The systematic import of a new technique is found in the new form which it gives to the problem in the solution of which it may be used. The discoveries of Mr. and Mrs. Dick, for example, have given us a technique which is transforming the problem of the control of scarlet fever. It becomes a problem of educating the community and the school authorities in

particular, so that children who are shown to be susceptible may be immunized against the disease. Consider now the import of the technique of eugenics in approaching the problem of race prejudice. Race prejudice is an unthinking emotional attitude based upon an equally unthinking sense of group superiority. It has had its function in the past of heightening group solidarity, but any valuable function that it may have had is lost, and it has become in our composite communities one of the most serious evils because of the extreme difficulty of bringing it under the control of the individual. Such control will be reached, however, when accepted judgments of superiority and inferiority are based upon the same secure analysis as that which selects strains of cattle or wheat. The most fundamental attack that can be made upon race prejudice is through the careful and scientific application of the intelligence test.

I have already indicated the import of this technique in the possibility of changing birth control from a socially censured escape from responsibilities into an intelligent constructive freedom.

Consider also its import in accepting or rejecting the legitimacy of war because of its supposed inevitability. One of the strongest arguments for this is found in the pressure of populations. When the growth of a population is recognized as lying within the control of the community, the assumption of an almost divine sanction of the war institution lapses.

There is one other aspect to which I wish to refer, and that is the added concreteness which the implications of this technique give to the human being who is most distant from us. Anthropology and all the comparative social sciences have been making it easier and easier for us to put ourselves in the places of those who are far removed from us by social caste, economic status, race, and differences of culture and civilization. They bring us nearer the emotional attitude which has been the inspiration of the universal religions, that of regarding every man as our neighbor. In fact, we may regard as paramount the results of the physical and social sciences in bringing the members of the

whole human community on earth into such close social relations, and into such intimate comprehension of one another, that the toleration of the evils of misery, of disease, of war, and ignorance, which spring from the isolations of communities from one another, becomes increasingly impossible. The point of view of eugenics is of importance here not only because it regards every man as a bundle of Mendelian traits, but still more because it enables us to approach so many fundamental social attitudes and situations from beneath the threshold of consciousness, and to approach them with the realization that they are susceptible of intelligent control.

Now it is just this reinterpretation of values in the face of the problems of society that constitutes the subject matter of the philosophy of history, and it is the theory of this reinterpretation that is that philosophy. Men came to regard sexual desire in terms of the family, and to regard the family in terms of children, and children in terms of populations and in terms of the sort of lives they would lead, and these lives in terms of the traits they inherited and the social training they had received; and at every step the old value had been enriched and reconstructed and had become a new end. This constitutes a continued advance, for the solution of each problem brings with it a deeper meaning and a richer value in living, but it is in no sense an advance toward a goal. It is the realization of the problem and its solution that is the whole zest of living, as research with its problems and their solutions is the heart of science, and not the fashion of the universe that science presents to us at any one moment. Men in human society have come into some degree of control of the process of evolution out of which they arose. The exercise of that control over the values of the life of nature which they live is the highest expression of their intelligence, and the theory of it is philosophy; looked at from the standpoint of the process of evolution, it is the philosophy of history.

I have pointed out earlier in this paper that none of the social sciences deals with the actual reconstruction of values but

presents only the techniques by which these values are given concrete form in society and in the experience of the individual. They must all be brought into relation to one another, and no one of them, not even sociology or ethics, can do this. There are, of course, two aspects of the problem, the practical and theoretical. If one's philosophy of history is of the Augustinian sort, and the meaning of nature and man is conceived of as the realization of some plan of which some idea can be formed, then one's practical philosophy is the ordering of values and the action that flows from them according to this plan. If one's philosophy of history is of the evolutionary sort, one finds the meaning of life in marshaling all the values that are involved in the problems of conduct and interpretation, and seeking such a reconstruction of them as will motivate conduct that recognizes all the interests that are involved.

Consider, for example, the problems presented by the conflicts between business conducted for profit and labor organized to increase its wage and shorten its hours. Whether one's attitude is that of the employer, or of the employed, or that of the ultimate consumer, the social process of production and its function in the community must be the basis for reconstructing the conflicting values. The efficiency of business for profit in production must be its justification, and the justification for the higher wage must be found in the greater value to the community of a business whose employees have a living wage. In facing the new problems that arise, or the old ones in new forms, we fashion more or less definitely a picture of the sort of a community we think it worth while to live in as the basis for the solutions. What we mean by the philosophy of a man's life is the group of values that he brings in in his reinterpretations, and particularly his ability and willingness to take into account all the interests that are involved. More especially, we consider the whole sweep of a man's spiritual horizon, his intellectual and aesthetic interests, and his tastes in recreation and relaxation. If we are asking for the philosophy of a man's life, we wish to know all the values, all the interests, and all the goods that are

going to arise by which to construct and comprehend the ends he will pursue. It is existent and operative in all of us, but there are those in whom it becomes a fine art, as in Montaigne and Sir Francis Bacon, in Bernard Shaw and H. G. Wells, or in Justice Holmes.

Theoretical philosophy has three aspects which would be recognized perhaps under the cognizances of metaphysics, logic, and psychology. They have to do with the meanings and import of things, with the method of conduct, including thought, and with the perspectives which individuals introduce into experience.

Ancient philosophy was entirely metaphysical. Its theory of reality was obsessed by the universality of meanings, and its logic and its ethics, and such psychology as it had, followed out the implications of this universality. Its dominant attitude was contemplation. Its thought moved securely along the necessary relations of the ideas which it contemplated. Its universality ironed out or eliminated all that was peculiar to the experience of the individual. It provided the theory of the withdrawal from life which was the final goal of the philosophy of Plato and Aristotle, and of the *ataraxia*, or undisturbed calm, which was the harbor that was sought alike by the Stoic, the Epicurean, and the Skeptic.

Since the period of the Renaissance modern thought has been ceaselessly rebuilding the structure of the philosophy of the old world. It has sought to retain the Ivory Tower of contemplation, while it has combined it with architectural motifs which from the standpoint of the Ivory Tower were bizarre and incongruous, namely, that of the experimental method of modern science and that of the primacy of the individual's experience. It was in keeping with the church's philosophy of history that the Ivory Tower should be retained, for from that Tower could be contemplated the goal of the universe; and it is the philosophy of history of the church which modern thought has been most loath to abandon.

The effect of this incongruity was to introduce three problems

which are insoluble in the form which they are forced to take by the assumption that knowledge is contemplation: the problems of epistemology, of mind and body, and of mechanism and teleology; and a large part of modern philosophy has been a continuous wrangle over these issues. But the essential difference between ancient philosophy (together with scholasticism) and modern philosophy since the Renaissance springs from the fact that the most competent and acknowledged process of knowing went on outside the Ivory Tower of contemplation, utterly careless of its sanctions and imprimatur, that is, the process of scientific discovery, with its test of experiment and observation. In its central concern, that of knowledge, philosophy ceased to speak with acknowledged authority and spoke as one of the scribes. Scientific knowledge, that great and growing body of knowledge by which more and more men guided their lives, instead of being a part of philosophy had become its most baffling problem. And this had the further consequence that whatever part of the territory that philosophy had ruled as its demesne proved to be cultivatable by experimental methods, ceased *de facto* to be a part of philosophy and became a part of experimental science. Thus appeared the secession states of physiological psychology, experimental psychology, behavioristic psychology, together with the whole list of social sciences.

It has been the common impulse of the schools of contemporary philosophy, such as pragmatism, neo-idealism, and neo-realism, to rehabilitate themselves again in these territories by the frank acknowledgment of the reality of the scientific object. In my judgment only pragmatism has successfully completed the revolution by abandoning the Ivory Tower. It alone is unencumbered with an epistemological problem. But I speak as a pragmatist. In any case, contemporary philosophy is seeking to maneuver itself out of philosophy's isolation, and we can turn from its subjective and transcendental idealisms, its agnosticism and *ignorabimus*, its solipsisms, its separation from the world of conduct by an unplumbed, salt, estranging sea, and put the question of this paper: What, if philosophy is at home in the

world in which we live and move and have our being, is philosophy's office there?

Its office must then be to enable us, who are parts of this evolving universe, to capture the meaning which it has for us because its evolutionary process appears in us as intelligence.

Metaphysically, things are their meanings, and the forms they take on are the outcome of interactions which are responsible for the appearance of new forms, i.e., new meanings. In a single phrase, the world is ceaselessly becoming what it means. This is true in thinking because thought is simply the communication to ourselves or others of what is.

Logically, i.e., in conduct of which thought is a phase, meanings become means. In an intelligent being there is such a selection of meanings that the consequence is already involved in the means.

Psychologically, the perspective of the individual exists in nature, not in the individual. Physical science has recently discovered this and enunciated it in the doctrine of relativity.

I must beg pardon for administering a system of philosophy in three capsules. I have merely wished to indicate that it is the technical function of philosophy so to state the universe that what we call our conscious life can be recognized as a phase of its creative advance. The otherworldliness of the reason was the theme of ancient philosophy, and the otherworldliness of the soul that of Christian doctrine, and the otherworldliness of the mind that of the Renaissance dualisms. It has been the long, long trek from this world of sense and sense perception, where intelligence could have no abiding city, to the city not made with hands, eternal in the heavens. But from the days when Galileo watched the swinging lamps in the cathedral and set his clay marbles rolling down the inclined plane, timed by his water clock, and thus compelled the universal reason to submit its findings to the test of perceptual experience, intelligence has been placing its reflective powers more and more fully at the service of society in its task of building the earthly city. As experimental science it has proved itself entirely competent.

With scientific curiosity and with the world hanging eagerly upon its findings, it investigates and re-creates the eternally novel universe that we inhabit and a part of whose living tissues we are.

But the method of exact measurement of the physical sciences has made use of approximations to situations of ideal simplicity in order to discover the laws of change in nature. There arose out of this method a materialism, a view of nature made up of ultimate physical particles located at points of space and instants of time. It was the other side of the dualism of the Renaissance. The whole qualitative aspect of nature, together with the meanings of things other than the scientific objects, was dumped into consciousness. That this was purely a methodical procedure is shown by the fact that science tested its own most exact findings by perceptual experience, and the further fact that science has not hesitated to recognize as the legitimate field of its study all manner of objects which are not physical particles, such as atoms which are galaxies of electrons, and molecules, and solar systems, and galaxies of stellar bodies, and plants and animals. It becomes, then, the office of philosophy to present an unfractured universe, qualified as well as quantified, together with all its meanings, and overcome the bifurcation of nature that arose from the methods of scientific measurement and philosophic dogma.

Furthermore, science seeks uniformities and ignores contingencies. It does this again in the interest of its method. It seeks ceaseless processes and ignores their termini. That this is solely in the interest of a method of research is shown by the fact that science has welcomed an evolutionary theory of stellar bodies and chemical elements as hospitably as the theory of the evolution of living species. And evolution involves both contingency and termini. Here again it is the office of philosophy to envisage a universe in which both the methods of experimental science and science's own interpretations, as well as those of everyday experience, are at home.

The point of approach of contemporary philosophy is found

in the interpretation of experience—that experience which is both the starting-point and goal of research science and the field of all our values and all our meanings. The striking difference between these contemporary philosophies of experience and the dualisms, the romantic idealisms, and the materialisms that preceded them lies in this: for them, both the percipient event and the consentient set, both the form and its environment, both the individual and his world, are recognized as standing on the same level of reality, and the so-called process of experiencing is recognized as a natural process on the same level of reality as all other natural processes. There are three outstanding undertakings of this philosophic quest of an unfractured universe: Bergson's three treatises, the last of which is best known, the *Creative Evolution*; Alexander's *Space, Time, and Deity*; and Dewey's last volume, *Experience and Nature*.

Philosophy is concerned, then, with the import of the appearance and presence in the universe of human reflective intelligence—that intelligence which transforms causes and effects into means and consequences, reactions into responses, and termini of natural processes into ends-in-view. We have seen that there are two philosophies of history which indicate two attitudes toward this import of reflective intelligence. One places the end-in-view outside the so-called physical universe (say in the Platonic-Christian city not made with hands, eternal in the heavens), and the responses and means and consequences in a substantial consciousness. The other locates intelligence with all that arises out of it within the world of things about us.

We should realize that philosophy is not itself the attitude. It is a realization of the import of the attitude and a criticism of it, just as science is not the intelligence that discovers the meaning of things and directs our conduct. Science is a method that arises out of the criticism and direction of the intelligence that the most unscientific of us are constantly using. The shift from the outside attitude to the inside attitude has been taking place for a long time. That is, we are taking over with more and more awareness the responsibility for the immediate environment in

which we live, and we have been shifting our so-called ideals from the New Jerusalem to this world. But we "hold out" on the world at various points, for various reasons. Some of them are practical reasons and some are sentimental, and some of them are reasons of inertia. Moving is a distressing process at best, and we have become so used to leading a double life. Society has not yet reached the adequate insight or the full willingness to respond to William James's appeal that it accept the responsibility for having introduced morality into the world.

I have reserved for my last paragraphs an aspect of this identification of reflective intelligence with the world within which it has arisen, which is profound in its import and in its emotional resonance, and that is the implication of the social character of what we call "reason." Reason is the reference to the relations of things by means of symbols. When we are able to indicate these relations by means of these symbols, we get control of them and can isolate the universal characters of things, and the symbols become significant. No individual or form which has not come into the use of such symbols is rational. A system of these symbols is what is called a language, though the term is likely to connote merely the minute part of the behavior involved which is denominated a system of phonetic elements. It always involves, even when language makes thought possible, a co-operative social process. It is society that through the mechanism of co-operative activity has endowed man with reason. It is only through communication that meanings have arisen.

The universality of meanings implies, then, the organized medium within which it obtains and prevails, what is logically referred to as a universe of discourse. Language is ultimately a form of behavior and calls for the rationally organized society within which it can properly function. It implies common ends, and common ends are *ipso facto* rational ends.

The very existence, therefore, in human experience of universal meanings sets up the demand for a society in which the common meanings shall become means that embody common

ends. But, as Hegel has insisted, universals may be either abstract or concrete. Food is an abstract universal when it is thrown among a herd of hungry swine who fight for the common good. Food is a concrete universal when it motivates the whole process of agriculture, its transportation, production, and distribution, as well as its consumption.

It is possible to conceive of a society whose individuals can all be at one, that is, be good, because wants are eliminated, an ascetic society, whose logical ideal Indian philosophy presented when it had discovered the universal in the form of a Nirvana, or a society of individuals whose abstract common end brings no strife—for example, the society of the New Jerusalem whose common good is the glory of God.

The other conceivable type of a rational society is one of concrete universals, that in which the common ends may be so embodied in highly organized means that to procure food for one's self is to take part in procuring it for everyone else. Adam Smith enunciated the ideal when he maintained that every sound economic bargain was good for both of those who were involved in the exchange. This is the ideal of a rational society which has been gradually taking form in men's minds since the time of the Renaissance. This ideal implies, then, something more than the abstract universality of its meanings. It implies that if the society in which these meanings obtain universally were sufficiently developed, the values which these meanings embody would be at the disposal of all of its members.

It is, however, an ideal of method, not of program. It indicates direction, not destination. Biologically phrased it implies that, since reason is a function of behavior in an evolving society of human individuals, it must always indicate a conceivable organization of the lives of those individuals in a social order which would realize the ends which reason presents.

It is the province of philosophy to work out the implications of the fact that reason has arisen in the process of social evolution.

PART V

SUPPLEMENTARY ESSAYS

XXIX

FRAGMENTS ON WHITEHEAD

A. QUESTIONS ABOUT WHITEHEAD'S CONCEPT OF RELATIVITY

ABSOLUTE space is gone. There remain, then, relative spaces. Different spaces must contain the same objects. They must represent the different spatial organizations which can lie in the different points of view from which things are regarded. A spatial perspective is a timeless space. There could be an absolute space within which these different spaces are unscrambled—Newtonian relativity—or the different spaces can be regarded as presenting real relations of things in this objective form, i.e., objective relativity. As we are dealing with the same world in different perspectives, there must be methods of stating one spatial organization in terms of another, i.e., there must be transformations. Projective geometry does something of this sort. This makes possible the reduction of all perspectives to a single perspective. We set up a favored perspective such as that of the sun, or the co-ordinates of the fixed stars, or we take the identical numbers which attach to corresponding spatial relations in different perspectives, and in terms of a rigid measuring rod we set up a map, hazily carried in the imagination, or accurately put on paper. Essential to this is the ability of each individual to put himself in the position of anyone else as setting up the same map. Actually one takes what may be called the organized attitude of those who are working co-operatively together, which presupposes that each uses such a map. If one surrenders absolute space, such a taking of an organized attitude with its map takes the role of absolute space.

Einstein demonstrated that, if one system is moving with

reference to another, the rigid rod in the system which is regarded as moving compared (in the perception of the man in the system at rest) with a like rod within his system will be shorter than his own rod and that, consequently, the time unit which determines the period within which the shorter object covers the space measured in the system at rest must be longer. This leads to temporal perspectives, as distinct from those of projective geometry. If now we set up a map which shall express both of these types of perspective, it must be in a world that assimilates space and time—a Minkowski world. There is, however, a fundamental difference in the use of these types of map. When a man gets a physical object before him within his field of manipulation, the physical object with which the experimental scientist deals, this takes on the same dimensions that it will have for any other man who does the same thing with the same object. If now each builds up his world from this standpoint with these identical objects kept in the same dimensions in thought, each gets the same world that the other gets. This is the common world of our thought and rests upon identical perceptual elements and identical measured distances measured by actual contact processes—carried on or presupposed in thought. So far as spatial perspectives are concerned, we can live and move in a common world. One cannot do this in a temporal perspective, for if one puts one's self in the place of the man in the moving system it is the man's rod that is shorter, and one's own that is longer. That is, one cannot find any common space-time situation within which each has identical perceptual building materials for a common world.

Whitehead, taking the position of objective relativism, accepts the different time systems as reality and asks what is common between them, and finds it in the levels, rects, and puncts.¹ The puncts are found in all systems, the rects and levels in at least two or three and, in fact, in indefinitely many more. He seems to assume that the presence of these identical

¹ See Whitehead, *The Concept of Nature* (Cambridge, 1920), pp 90 ff, *The Principles of Natural Knowledge* (Cambridge, 1919), chap ix, esp pp 117 ff

elements in different time systems is responsible for the common Euclidean structure of the different spaces, which become the permanent spaces of different time systems. So far as these perspectives are practically only spatial, i.e., where the velocities do not approach that of light, we can continue to operate in the same sort of a common world as that referred to above.

There are two questions to be asked here. How far is Whitehead justified in assuming that logical entities such as levels, rects, and puncts can have a constitutive character in determining the perspectives or spaces and times of the different time systems, and, second, how far has he set up a metaphysical event which is the ultimate reality in independence of the time systems, and thus has surrendered his objective relativism? Has he avoided bifurcation?

Given the common world, constructed of physical objects of identical dimensions as they appear in the manipulatory areas of all, and located by means of the common map, what is the meaning of the assimilation of time to space?

The common world serves exactly the same purpose that absolute space filled of providing that within which all perspectives can be realized. What bearing would this have upon the Michelson-Morley experiment and the formulation of the Maxwell equations in independence of a stagnant ether by the Lorentz transformations?

The question comes back to the Fitzgerald contraction which takes place whenever we undertake to make congruent a moving rigid length with one that is at rest by means of visual coincidences. Tactual coincidences are impossible because of motion. If the observer places himself in the position of the moving object to give it reality as a physical object, he must be at rest. In this case his former system would be in relative motion. Or he must accept the differences in time of the arrival of light rays which come from the extremities of the moving body in getting purely visual coincidence. If he is seeking physical reality, it is the first that he will undertake, and in that case light will have the same velocity in every system. While he is at rest upon the

earth the Michelson-Morley experiment is necessarily negative. If he were able to visualize objects in space outside the earth beside which he was moving at the rate of nineteen miles a second, they would also be subject to the Fitzgerald contraction. If he places himself in imagination outside the earth and observes it as it passes by at this rate, it becomes subject to the same contraction. In the observation we are compelled to place ourselves and our spatial world at rest. We cannot make light by which we construct our visual world independent of that visual world. What the experiment revealed is that ether, whatever it is or indicates, is not a physical thing. If light, for example, is a stream of photons, the negative effect of the Michelson-Morley experiment is to be expected. The Lorentz transformations presumably stand for the changes in the units of space and time and energy necessary if we use purely visual means of measuring moving physical things and for the assumption of the ether which Maxwell's equations imply.

B. INTERRELATED TIME SYSTEMS OF WHITEHEAD

The intersections of time systems, in Whitehead's natural philosophy, are essential to their structure.

There is no order in the time system in its own passage. There might be a sense of passage in minds but no way of cutting off equal portions of this passage. The parts that actually appear are specious presents which have uncertain edges. They are varying in their compass from individual to individual and in the experiences of the same individual.

There is no theory of congruence which can give us a lasting unit of measure of space. There is no assurance that what extent an object has at one moment it retains at other moments. Poincaré has developed the impossibility of securing such assurance of congruence and has stated that all measures are conventions.

The assumptions of Whitehead are that there is evenly flowing passage in nature and that this passage registers itself in different time systems. He goes back to Newtonian relativity.

What is moving in one system is at rest in another. Newton had an absolute space within which this motion is actual. The relative motion is then reflected only in the experience of the individuals, in minds. Given a uniform motion, the laws of mechanics still remain the same whether one assumes that one spatial frame is moving or that it is at rest while the other system is in motion. We are, therefore, unable in such a situation to determine which object is in motion, though an accelerated motion and one which is not translation in a straight line reveals absolute motion.

The recognition that absolute space is unthinkable throws us back on spaces which belong to the system of bodies in question. Each has its own space. But since in the instance presented the same set of facts are presented, whether we assume one body with its spatial frame to be moving or the other, we must recognize that each has as much reality as the other. We may now relegate these systems to the experiences of individuals and assume that the realities to which they refer lie outside experience, in absolute events and their coincidences and their intervals; or we must accept these different systems as existent with the experiences within which they appear. In which case we must identify the events as identical, though they appear in different systems and yet recognize that their appearance in these different time systems is actual.

Whitehead thus seems to set up a world of events as an absolute and a passage which admits of alternate time systems.

The question that at once presents itself is as to the interrelation of these different time systems or different modes of passage of the same event. The form in which this appears in experience is that of the complete appearance of all events in any one time system. The recognition of another time system transfers the whole of nature to this time system. One is at liberty to adopt one or the other. One cannot adopt both, for, having adopted one, there is nothing left for the other. One cannot have both the Copernican and the Ptolemaic systems. They are essentially alternative systems. That is, a nature closed to mind can-

not present one with that common appearance of two or more perspectives to which thought arrives.

However, Whitehead does find in the logical structure of the level which appears in the intersection of two time systems an interaction of the different time systems. Therefrom spring levels, rects, puncts, and parallelisms, and hence order, and congruence with the possibility of measurement, and the structure of Euclidean spaces.

C. CONDITIONS FOR TIME SYSTEMS

I can see no possible meaning in the existence of a time system, that is, a certain order of succession of events, apart from some process that is maintaining itself as it passes into the future that emerges. Assume for the moment that the universe is a congeries of electrical particles each with its field. There are no sun and no planets; there are no heavens and no earth. There is only a swarm of electrons and protons. Is there any meaning in a universe so constituted in speaking of a time system which answers to the revolution of heavenly spheres and another which answers to the revolution of an earth on its axis? Surely one must advance to the Mesopotamian and the Egyptian and the Greek astronomers, and the astronomers of Pergamos and of Alexandria, to put any significance into the statement. By what right do we cut out and fence off certain myriads of these electrons and protons and call them an object such as the earth? Every electron is related to every other electron by its field as really as it is to any other. The cutting-out expedition must be undertaken by something that is not found in their fields.

Now Whitehead's objects which are ingredient in events have no constitutive power. They can only express relations which arise because a certain group of particles are considered as a whole. The cutting-out expedition must have already taken place. Though they are suggestive of Platonic essences, the electrical particles do not participate in them, and take on their forms, nor are they Aristotelian formal causes. Every object not only involves certain relations which go to make the content

of the object but it involves also the isolation from other relations. Thus the tree involves the complex relationships of the various chemical and physical readjustments going on in the restricted extension of the tree. They would not be these relationships if we followed out the readjustments that take place in the whole universe, for we could not stop at the confines of the tree. Even if we assert that the entity of the tree must be there because we do think it, because it is the terminus of thought, that does not account for the historical appearance of the tree out of the world of physical particles, unless some thought takes this entity and applies it to an isolated group of particles. While the object, as content apart from the supposititious electrical particles, may be stated in terms of the relations of the particles, being in a sense the structure of the object, that structure is not the object in experience. It is in analysis that these relations appear, along with the physical particles, in the immediate or distant past. The couch is there as an unanalyzed whole in conduct. Its relations appear in the analysis, but in the couch that one stretches one's self out upon they are not there either as internal or as external. Bergson is entirely correct in asserting that the results of such an analysis distort and deform the object, if we assume that the object in immediate experience is there as an object of knowledge. But the analysis is a process of building or repairing the couch. The couch one lies upon is not there as an object of knowledge unless there is some question as to its identity. The analysis in terms of a past may serve to identify it, and in this process the elements of the analysis may be found both in the extended past and in the hypothetical future; but when the couch emerges as a definite article of furniture, it is what it is and not a compound of parts and relations. And, of course, this is also true of the physical particles and the relations which appear in the analysis. They are what they are, whether or not we call them adjectives and pseudo-adjectives of routes in extension. We can conceive of a world of physical particles, antedating a world in which there are living forms, as we conceive of a world of living

forms antedating so-called conscious forms, though what the meaning of these as objects of knowledge may be is another matter; but, if we abstract motion from these particles, I fail to see how it is possible to conceive of any consentient sets, for there would be no meaning in the isolation of any group of events in their succession rather than in some other succession. And if we assume a motion, as Whitehead has shown,² there must be a field of rest which involves a here, and this involves a reference to some specific event. We will waive the question whether these moving particles were objects in the sense of moving things about us, and remain with our historic imaginations. A motion taking place in a field at rest is essential to the existence of any determinate field or consentient set at all. Otherwise we are left with simply indeterminate succession. A moving particle maintaining its direction, velocity, and momentum is an event, or series of events, that cuts out a field within which these characters of the process can express themselves. That we can state this motion in terms of the past, i.e., in terms of positions and instants occupied and can then analyze these into routes of events, does not absolve us from accounting for the selection of the particular succession of events which constitute these specific routes, when any event in the route can just as well be conceived of as succeeded by an indefinite number of other events than those belonging to this route.

D. ANALYSIS OF WHITEHEAD'S ACCOUNT OF SPACE

There are an indefinite number of . . . modes of time stratification . . . This admission at once yields an explanation of the meaning of the instantaneous spatial extension of nature. For it explains this extension as merely the exhibition of the different ways in which simultaneous occurrences function in regard to other time systems. I mean that occurrences which are simultaneous for one time system appear as spread out in three dimensions because they function diversely for other time systems. The extended space of one time system is merely the expression of properties of other time systems.³

This is an explanation of the dimensional spread of nature in sense awareness. We are observing immediately the results of

² See *The Concept of Nature*, pp. 105, 188-89.

³ *The Principle of Relativity* (Cambridge, 1922), p. 54.

other time systems of whose existence in sense awareness we have no inkling. Motion is an immediate datum of experience. The act by which one places one's self in the moving body as at rest, and organizes the world from that standpoint, is a reflective process, which can only be brought into the field of sense awareness after analysis and deliberate reconstruction. Even when one in a train passes rapidly from the attitude of the movement of one's self to that of the movement of the landscape, one is either in one attitude or the other, and in each there is an extended enduring world within which the motion takes place. The effect is registered in each time system of the different properties which attach to the events in so far as they belong in other time systems. The effect, in so far as sense awareness is concerned, is that of being at rest or of being in motion, i.e., the effect of being in one state rather than the other is produced by the opposite state, or, rather, the extension of one time system is produced by the motion in another time system or systems. But why should the properties of the events in different time systems produce effects in one another, although all events are found in each time system? It is easy to recognize that a point for a traveler on a railroad train is a line for the man who is watching the train pass by him, but why should the property of being a line which does not enter into the sense awareness of the man whose attention is concentrated on the point before him extend the space of the traveler into a spatial dimension? The relative relationship of the point and the line are easily grasped by thought, but this is a question of the sensuous spread of the space of a single time system, within which are located all the events that there are. It does not in any way affect in clarity the dimensional spread of nature for us to put ourselves in the position of the man in Mars, or that of the man in the sun, or even in that of the man in an airplane. We simply find ourselves in another space with its spatial spread and the difficult task of finding the correlatives of elements in one space in another space. How does the effect take place in sense awareness?

Furthermore, Whitehead maintains that accelerations and decelerations are essential facts of the life-history of any body and are not accidental outcomes of the arbitrary choice of co-ordinates, i.e., accelerations and decelerations as distinct from uniform velocities. Presumably uniform velocity is not a fact of the life-history of a body in this sense but may be stated in terms either of rest in one time system or of motion in another, i.e., it is an outcome of the choice of co-ordinates. But after all, an acceleration is a fact of motion, and, as Einstein has shown, it is possible to express it in terms either of an accelerated body or of an accelerated environment with an opposite sense of direction, except in case of rotations. In what respect would the life-history of a particle differ if it moved with an accelerated velocity with reference to surrounding objects, or if the objects about it moved with accelerated velocity in an opposite sense?

The reflection of one time system into another in the foregoing sense, that is, in sense awareness, must follow from the passage of nature, from the assimilation of time and space in extension. In immediate experience we abide in a timeless space, i.e., in a spatial world in which the character of "here" persists with reference to objects at rest. In this we divorce time from space.

The effect is in "exhibiting the different ways in which simultaneous occurrences function in regard to other time systems." That is, there is a line for the man on the platform because the objects of the landscape which are simultaneous with him are successively simultaneous with the point under the traveler's pencil. This would imply that an organized tridimensional space arises because an individual maintains cogredience with a stable landscape, i.e., all the elements in the landscape have a persistent relation of here and there—in it all the elements are simultaneous with the individual and with one another—while in his movements in the landscape he is establishing successive simultaneity with himself and the different objects. It implies a double attitude.

The fact that the different stratifications of nature expressed

in the different time systems do affect one another is evidenced in the fact of motion. All the passage of nature, i.e., all the events of nature, is or are found in any system of nature. In the abstraction of an ideal instant they would be all instantaneous. They would be all simultaneous. All nature would be there in that fictitious instant of a time system. But an instant is a fiction. At any moment which, however closely, approaches an instant, nature is passing, and is passing in different systems of passage. The meaning of different systems of passage is given in the different simultaneities. To assume that the man in the train established simultaneity with the same event particles as did the man on the station platform reduces experience to the fictitious instant, or a series of such instants.

Whitehead's theory of the tridimensional extension of instantaneous space seems to come to this: that different time systems reflect into one another. Difference in time systems seems to turn upon different orders of passage of events upon one another.

Motion in experience involves a permanent space in which changes of position occur, so that passage is abstracted from the given spatial order, leading to an abstracted time.

The theory of relativity returns passage to space. The permanent space of experience must, then, be regarded as passing. Its permanence must be found in the preservation in passage of a certain order of passage. Admitting different orders of passage, indeed an indefinite number of these, the permanence of any one of them must be dependent upon its relation to some factor which is not given in the mere passage of events.

This factor Whitehead finds in cogredience, the relation to a percipient event.⁴ This expresses itself in the "here" of the percipient event, and the "there" of the permanent spatial elements in the relationship to the "here" of the percipient event. These elements in their passage follow so-called historical routes and in the permanent space of experience appear as points. Other routes become spatial routes, and the following of these routes

⁴ See esp. *The Principles of Natural Knowledge*, p. 79

in experience is motion. While, then, in passage the event-particles in historical routes have a determinate direction, those in spatial routes have no such determinate directions in their relationship to the cogredient set.

It is, however, possible to recognize some other order of passage, presumably determined by some other percipient event, in which each event-particle which lies in a spatial route within the permanent space of one percipient event lies in an historical route, i.e., is occupied by a point in the permanent space of this percipient event. An object occupying an event-particle in a spatial route, in other words being in motion in a permanent space, could then be regarded as at rest in some other permanent space. An object at rest in a point is then occupying a series of event-particles which retain the relation of "there" to a percipient event, or to its "here." The order or passage is a determinate order because the event-particles retain the same relationship to the percipient event, in other words, retain the same position. In a spatial route the event or the object occupying it is succeeded by an event which has another relation to the "here" of the percipient event, i.e., another position. From the standpoint of the permanent space of this cogredient set the order of passage of the moving body is indeterminate, while the order of passage of the event-particles in its points is determinate.

I am not entirely clear whether Whitehead regards the different time systems, i.e., systems with determinate orders of passage, as dependent upon percipient events, i.e., whether every time system is a cogredient set. In any case position may be generalized by regarding it as located in all the indefinite number of time systems within which it is found. This would be an abstract absolute position, but it would connote a different spatial position in each permanent space answering to the cogredient set of each time system.

Simultaneity, involving a "now" as well as a "here," does seem to necessarily implicate a percipient event, for it is a relation belonging to a duration, i.e., the whole of nature from the

standpoint of a cogredient set of a percipient event within a passage, which roughly answers to a "specious present" Events which lie within a duration are simultaneous. They are, however, passing. For the sake of simplicity we reduce the temporal spread of these durations, approaching a fictitious instant. The limit toward which such reduction proceeds must be found, however, not in the spatiotemporal extension but in the series of homologous quantitative relations of the physical objects that occupy the events.

Simultaneous events at a moment in any one time system will be arranged spatially at this limit of no temporal spread. These same events in another time system at a moment will have another arrangement, for what is simultaneous in one system will not be simultaneous in another. Select any one event in the first time system, and, regarded as an event-particle, it must appear in the second time system. It cannot, however, have the same antecedent or the same succedent in the second time system as those which it has in the first, i.e., those event-particles which are arranged as simultaneous in the first in a moment in the one time system will not be present in the simultaneous spread of the other time system. The group of event-particles, then, that appear in the intersection of two time systems will be those which are conceived of, in so far as they are event-particles common to each system, as having different routes of passage. The following event-particles cannot be found in the durations of either. The group is a logical group, and cannot be the terminus of sense awareness. The particles belong to an instant. As a group they lose temporal extension. Distribution in spatial extension is dependent upon cogredience, and this belongs to durations and cannot be attributed to this group which must abstract from the structure of each duration dependent upon cogredience. They can, however, be located as event-particles in each group and so be given a distribution which does not belong to them as a logical group but as a set of event-particles dissected out of a moment in each duration.

Structural relation owing to cogredience in one duration is

expressed by historical routes, which retain the same characters of here and there, which become points in the timeless space of that duration. No historical routes can be identical in two durations of different time systems. The event-particles which lie in a historical route in one duration will be distributed in spatial routes in the durations of another time system. This distribution will be a determinate one, so that there will be a definite direction in the duration of one time system of the event-particles as they are ordered in another time system, and according as one places himself in one time system or the other the direction will be the opposite of that which would have obtained in the other. This distribution with its direction, however, belongs to a duration and not to the instantaneous group which is the intersection of two time systems. This spatial direction does, nevertheless, enable us to orient the logical group in the two durations. No one of the event-particles in this logical group can lie in this direction, for in that case it would belong to the succeeding instant and would not belong to the instantaneous intersection of these two time systems. This direction in each time system lies in one spatial dimension. It follows, therefore, that the event-particles which belong to the group which is the intersection of two time systems lie only in two dimensions in each, that is, the group is a plane.

The difference in two time systems will reveal itself in the different succession of event-particles, i.e., the event-particles in a historical route in system A will be extended along a spatial route in the timeless space of time system B. In a moment of A the event-particles, which include all those of the universe at that moment in that system, will be spatially arranged and apart from the level which includes those in the intersection of A and B; none of them will be in B, and none of those in B except those in the level will be in A. The structural formation of these two time systems which is revealed in the direction of A in B, and of B in A, will bring every event-particle in the moment of A into some moment of B, for all the event-particles of the universe appear in every time system. There will be,

therefore, an indefinite number of levels in the moment of A which are intersections of the moment of A with other moments of B. These levels will lie in the family of moments of time system B and will, therefore, not intersect each other; in other words, they will be parallel, and as they are the same levels lying in two different time systems they will be parallel in A and will divide the instantaneous space of A by parallel planes.⁵

What is it in sense awareness that reflects this simultaneity in the instantaneous moment of one time system of the event-particles which are in successive moments in another time system?

It is easy to see in a duration that the event-particles that occupy a point in a timeless space of one time system will be spread out in a line in the timeless space of another time system, e.g., the point under the pencil of the traveler in a railway train will successively occupy the event-particles of a historical route in the time system of the traveler, while these same event-particles will be stretched out in a line in the timeless space of an observer beside the track. In this case, however, the event-particles in each time system are passing. They are not simultaneous in the moment of one system and successive in another. If the order of an instantaneous space is the reflection of a temporal order, i.e., of an order which is successive and not instantaneous, if the actual order of the instantaneous space to which our quick perception approaches derives from an order which is successive in other time systems, there should be something in sense awareness which betrays this dependence. In the case of the durations, motion reveals the correlation between the point (or the event-particles which occupy it) and the line (or the event-particles which occupy it). Motion in sense awareness does not correlate the spatial structure of an instantaneous space with the successive moments of another time system. There is no motion in an instantaneous space. In the three-way spread of instantaneous space there is order and nothing in sense awareness which suggests any other time system which is

⁵ See *ibid.*, chap. ix, and *The Concept of Nature*, pp. 95 ff.

passing instead of being instantaneous, and yet Whitehead assumes that the order spread of instantaneous space is the reflection of the moments of other time systems, so that a spatial route in an instantaneous space represents a series of event-particles which in another time system are arranged in successive moments and may constitute a historical route. Conceive of a mass-particle in one time system occupying a historical route. It is the same mass-particle which gets its individuality from the historical route. Conceive these same event-particles in another time system of such a character that they will be simultaneous. Presumably the same mass-particle occupies these events, but the same mass-particle cannot occupy different events in the same moment. Furthermore, Whitehead states: "Along such a [historical] route there is a definite antecedence and subsequence in time which is independent of alternative time-systems."⁶

The approach must be from the standpoint of Whitehead's creative advance of nature.⁷ This advance takes place in an indefinite number of time systems and, therefore, in a four-dimensional extension. The fourth or time dimension is what reveals the possibility of different time systems of the events.

E. ANALYSIS OF WHITEHEAD'S VIEW OF PERSPECTIVES

In speaking of the organism and its biologic activity as antecedating the perspective of the social individual and the social perspective of the community, one is speaking of an object which is in the social perspective, in so far as its past is essential to its import. These pasts have the same hypothetical reality as that of the distant object. They are brought to the test in acting upon them and attaining the stamp of success. What one is presenting are these past forms of the social perspective in which abstraction is made from certain contents, while others that are common to the human group and that of lower animals and physical enduring structures (which may still be called organisms in a generalized sense) are presented as existing.

⁶ *The Principle of Relativity*, p. 68.

⁷ *The Principles of Natural Knowledge*, p. 97; *The Concept of Nature*, p. 34.

Such a statement either implies a situation which antedates all perspectives or it implies that the most generalized structures, as well as those of a biologic type, are the essence of reality. This is Whitehead's position. He assumes an activity below the spatiotemporal structure which he speaks of as substantial and which individualizes itself in the organisms and their perspectives, and a Platonic heaven of eternal objects containing the patterns through which this individualization takes place. If these eternal elements of the universe are to be brought within the reality that it is going on in the perspectives, there must be found there, first of all, the so-called substance. This necessity, however, is met by the recognition that the function of knowledge is not that of presenting a reality as existing in independence of the knowing process but as the discovery of something which is essential to conduct but is only hypothetically presented. When the hypothesis has been accepted, the so-called object of knowledge ceases to be known and is for conduct simply there. The process of nature is the organization of perspectives. In the second place, the so-called eternal objects must be recognized as eternal only in the sense of being irrelevant to passage, and they must be found in the organization of perspectives. Such an organization of perspectives becomes the important problem.

If knowledge is a two-term relation that stands outside conduct and behavior, or of the process of nature in general, it is essential to set up an entity as the relatum, no matter how abstract it may be, and this carries with it the world of subsistence. If, on the other hand, one regards knowledge as the process of establishing a hypothetical field of conduct in the presence of the conflicts of alternative terminations of acts which are already initiated, thinking is simply the indication of a possible plan of conduct, an extension of the manipulatory area, by placing the content of resistance into the distance characters and thus making them into hypothetical things. The meanings of things are their relationships within this present in so far as these can be indicated. The reference is not to an order of ideas

or eternal objects which exist or subsist apart from the field of experience, or to any substance which underlies the experience, but to the further organization of experience in view of the developing problems within which we find ourselves. When we can act, that with reference to which we act is there and is not being known.

The organization of perspectives as Whitehead presents it is found in the aspects which events as individualized reflect into other events and other events into the event in question. So far as the event is an organism in Whitehead's sense, the reflection of it into other events as a whole is of trivial importance,⁸ but the reflection of its different parts, as parts of a process, becomes of importance. There is a set of durations which are the reflections of the parts of the process and in a sense a repetition of the whole. In so far as these are reflected into a permanent spatial order, there is a cumulative effect. Thus I assume that a melody as a whole event reflected into other events would have no important import, but into a permanent present it is affecting the partial situation by its recurrent pattern. That is, the whole would have an effect if it appears in the situation of the part, and it is the time phase that makes this possible.

Is the social perspective simply an outcome of the inter-organization of things? There would, of course, be a difference in any case. The social organization of perspectives involves the so-called consciousness of the situation. But this consciousness of the situation is but the indication of the meanings to the individual in so far as he indicates them to others. The organization of perspectives as Whitehead presents it is the ingression of hierarchies of eternal objects in their relationships to one another into events, in the individualization of the substantial process underlying nature.

Can we assume a nature that is so organized apart from social organization? Whitehead appeals to the structure of things in so far as they are processes and to the time phase

⁸ See *The Principle of Relativity*, pp. 21 and 26, *Science and the Modern World* (New York, 1925), p. 174.

which reflects into permanent spaces and the enduring objects in these spaces the past and future elements of the process. This calls for a principle in his organism which differentiates time from space. This principle seems to be the enduring character⁹ of the process in a permanent space through the reflection of the past and the future of the process into the passing present. Endurance of physical things implies a permanent space. Endurance of a process is only reached through the presence in the passing phase of earlier and later phases. Thus an iron atom must have time within which to complete the revolutions of its electrons to have the character of iron. That the revolution should be a revolution, it is necessary that the preceding phase and the successive phase of the revolution should be present in that portion which is taking place, and this can only take place in a permanent space in which the positions of the electron before and after can be there with those at present occupied by the electron. A permanent space is the habitat of the past and future phases or parts of the whole process, and thus enables the whole to be present in the parts. The permanent space gives the spatiotemporal structure of the whole. Such a permanent space arises through the intersection of different time systems but also through the agency of the organism in the event.

The organization of the different time systems, then, is involved in the organism itself. The organism in its own perspective could not be what it is if it were not for the other time systems and their organisms. And the preservation of the organisms is dependent upon the favorableness of the adjustment of each organism to an environment which consists of other organisms in their perspectives.

This, then, would seem to be the outstanding difference between this doctrine of organisms and their environments and their evolution, in contrast with the current conception both of the organism and of its environment. The current doctrine assumes a field that is independent of the organism, except in trifling effects—at least in the case of organisms lower than

⁹ *Science and the Modern World*, pp. 153, 175, and 183.

man, i.e., in biological evolution and in the evolution of inanimate structures. It assumes organisms which have a principle of structure and process that at least is statable in terms of the environment in its independence of the organism, i.e., in physicochemical terms, so that the entire process of nature can be scientifically formulated in terms to which the peculiar nature of the organism, whether living or inanimate, is indifferent. The result of this is that, while the causal processes which are presented in the physical sciences can be appealed to to explain the structure and processes of the organisms of whatever type, there is no causal or otherwise determining effect of the organism upon the field of nature within which the organisms arise and pass their period of existence. The doctrine of perspectives, on the other hand, assumes that the environment of the form is in such a sense an existence in nature that it cannot be stated in terms of a situation to which the organism is indifferent. The conception of the environment on the current doctrine is that of an external selection of the causal factors and processes which appear in the history of organic structures. This selection is the expression not of facts in nature but of an interest which is extraneous to that of the operations of the fundamental laws of nature. In physicochemical processes there is no distinction between life and death; there are, in fact, from the standpoint of these laws no objects in nature except ultimate physical particles (in whatever form they are recognized) and the whole congeries of these particles in their changes with reference to one another.

The doctrine of relativity has forced another conception upon science, and the peculiar interest of this change lies in the fact that it comes not from the biologic sciences or those physical sciences which are interested in the structures to which a doctrine of evolution may be applied. From the standpoint of relativity the velocity of motion of an object associates with it other objects which are moving with a like velocity, so that they are at rest with reference to one another. Then all other objects are in motion within the space-time which such a field of bodies

at rest implicates, while they are at rest in the space-time systems which are determined by the selection of other bodies with a like velocity of motion with themselves, or are moving with different velocities according as they are regarded as located in the time systems of different consentient sets. The effect of the statement of the changes that take place within these different consentient sets is to give different values to the fundamental units of measurement, spatial, temporal, and energetic, if they are regarded from the standpoint of the time system within which they are at rest, or if they are regarded from the standpoint of other systems. The result of this is that every body has an environment of nature that belongs to it if it is regarded as at rest, within which the physical definitions of other bodies which are conceived of as in motion will be different from the definition which would be given to these other bodies if they were regarded as at rest. Thus each body gets an environment of its own that is determined by its simultaneity at rest with other bodies which from its standpoint are also at rest. There being no absolute space or time, these space-times are the existent orders of nature. The result of this is that objects have different natures in so far as they exist in different environments. The question then arises: By what right are they considered the same objects when they have this different nature in the different environments or time systems?

Whitehead's answer to this question is found in his assumption that the fundamental realities in nature are events which may fall into different time systems. The judgment of identity of the event involves the affirmation of it as the same in the midst of differences. In so far as the event is in the environment of the individual, it is what it is in that environment, i.e., it has the spatiotemporal structure which belongs to it in that environment. It is only in so far as the individual can become in some sense cogredient with the system in which the object, moving in the environment of the individual, is at rest that the differences due to the different systems can enter into the judgment of the individual. Thus in a train one can be in the time

system of the train in which the landscape passes by one, or one can become cogredient with the environment and the train with its occupants which is moving through it. In this fashion one can recognize that a yard measure will have one length if it is regarded from the standpoint of the field of the landscape at rest, while the same yard measure in the train from the standpoint of the man in the landscape at rest will be shorter. If we take the standpoint of the train at rest and the landscape as moving, the yard in the train will be the longer, while it will be shorter in the landscape. There will be the corresponding changes in the rate of the clocks in the train and in the landscape, and in the estimates of mass or energy of the objects. What is, then, essential to these judgments is that the individual should be able to take both attitudes, that in the train and in the landscape, and the two attitudes must be merged in a single attitude within which the judgment takes place.

I take Whitehead's account of this to be that of thought which recognizes events as entities that have essential natures, but which may be in different time systems and thus establish different simultaneities. As passing events they are what they are, no matter what their simultaneities are. Then the individual becomes cogredient at least in thought with objects occupying these events in different time systems. The identification of the essential event, however, except as it is immediately passing in an experience of the individual, would be possible only by its structure as determined by the consentient set within which it lies, and it would be a group of identical characters in the object in the different sets which would enable one to identify the object occupying the event and so to recognize the differences which belong to its position in the different sets or time systems. This implies that the individual does occupy the different systems in some sense within the same specious present, so as to make the identification and also to establish the differences. We have no difficulty in identifying the trees and rocks and houses whether they are flying by us or whether we are flying among them. We never attain velocities which make

any perceptible differences in the objects because of their presence in one system or the other, but we can present situations such as that which Eddington uses, in which an airplane travels at the rate of 160,000 miles a second, and recognize in imagination the foreshortenings of dimensions and the lengthening of time periods as they would appear to an observer who could observe the details of an airplane proceeding at such a velocity. There still would be identities of characters in the men in the plane and other things there which would enable us to recognize them as the same though distorted by their existence in the time system which such a velocity implies, and we can place ourselves in the plane and recognize objects which would be subject to the same type of distortion on the earth as it sped by us.

Is this capacity for placing ourselves in the plane when we are on the earth, or on the earth when we are in the plane (the ability to be cogredient with the landscape or with the train in which we are traveling) due to some power that belongs to thought as such, or is this power of thought due to the capacity to place ourselves in the attitude of the object which presents itself in the experience? The doctrine which I am advocating is the latter, that meaning as such, i.e., the object of thought, arises in experience through the individual stimulating himself to take the attitude of the other in his reaction toward the object. In the case of physical objects this attitude is resistance though the mechanism by which this power of placing the activity of the organism in the distance stimulus has arisen in the conversation of gestures with other social individuals in the same co-operative acts. Meaning is that which can be indicated to others while it is by the same process indicated to the indicating individual. In so far as the individual indicates it to himself in the role of the other, he is occupying his perspective, and as he is indicating it to the other from his own perspective, and that which is so indicated is identical, it must be that which can be in different perspectives, i.e., it must lie in a perspective which is an organization of different perspectives. It must,

therefore, be a universal, at least in the identity which belongs to the different perspectives which are organized in the single perspective; and, in so far as the principle of organization is one which admits of other perspectives than those actually present, the universality may logically be indefinitely extended. Its universality in conduct, however, amounts only to the irrelevance of the differences of the different perspectives to the characters which are indicated by the significant symbols in use, i.e., the gestures which indicate to the individual who uses them what they indicate to the others for whom they serve as appropriate stimuli in the co-operative process.

There are two characters which belong to that which we term meanings: one is participation and the other is communicability. The meaning which is indicated by the individual must be in the perspective of the individual as well as that of the others to whom he indicates it. So far as the perceptual world of physical things is concerned, this character is that of resistance spatiotemporally defined. This perceptual world, as already indicated, is in conduct a mediate world which lies within the whole activity which goes on to consummations. Its center is the manipulatory area in which the distance stimulus and its contact fulfilment are given and this portion of the whole act is successfully completed. Its extension into the realm of distance stimuli beyond the reach of effective contact takes place through the mechanism of social conduct. In this, the distance stimuli of other organisms call out responses in the individual which affect him in the same fashion as they affect the other organisms in carrying out the social act. The result of this is that the individual finds himself tending to act as the other individuals. The actual merging presumably takes place because it serves to facilitate the execution of the complex social act.

It can take place only in so far as some phase of the act which the individual is arousing in the other can be aroused in himself. There is always to this extent participation. And the result of this participation is communicability, i.e., the individual can indicate to himself what he indicates to others. There is com-

munication without significance where the gesture of the individual calls out the response in the other without calling out or tending to call out the same response in the individual himself. Significance from the standpoint of the observer may be said to be present in the gesture which calls out the appropriate response in the other or others within a co-operative act, but it does not become significant to the individuals who are involved in the act unless the tendency to the act is aroused within the individual who makes it, and unless the individual who is directly affected by the gesture puts himself in the attitude of the individual who makes the gesture.

The essentially social character of the act in its meaningful phase is evident not only in this mechanism but also in the content of the act. In certain simple processes, such as the co-operation of two individuals in moving a log, when one individual points to the place at which the other shall heave, he probably has a very distinct tendency to carry out the process which he is indicating to the other. Thus one is likely to seize the implement from awkward hands and find relief for the tendency which is present in doing what he starts only to direct. In more complex processes there may be present only the verbal stimulus which is so related to the completion of the act that it merely expresses the completion of the act in its co-operative connections. It is its fitting into the whole process of social mediation which becomes its dominant meaning, but behind this coherence within the complex act lies its import as calling out the actual overt process. When we direct a person to go to a distant place and there do certain things, the meaning of the words which we use is dominantly logical, i.e., while the complex activity is present in the individual with its organization controlling the development of the act, the successful organization of the signs used in communication is what occupies attention, and the fitness of the stimuli for their function is left to the whole organization of the act within the individual. The interest is in "getting something across" that already lies in the ongoing behavior of the individual, but it is behavior in

which the individual is taking the attitudes of all involved, or is ready to take these attitudes. It is important to recognize that this part of the process is occupied with but a portion of the whole act, the mediatory part, both in its dealing with mediatory things, which presuppose adjustments, and in its dealing with consummations only in terms of the means which lead to these consummations.

The individual, then, occupies his own perspective as a phase of the whole social perspective which is involved in his social conduct. The organization of this perspective involves, first of all, the inhibition which alternative completions of the act bring with them. In the second place, it involves the individual taking the attitude of the other, through exciting in his organism the responses which his immediate acts call out in the others. That these initiated responses of the others should come to be of so much importance implies that the act is a social act and that the acts of the other can be aroused in each individual, and that the arousal of the attitudes of the others in the separate individuals furthers the social organization of the composite process.

The objectivity of the perspective of the individual lies in its being a phase of the larger act. It remains subjective in so far as it cannot fall into the larger social perspective, e.g., in dreams and the play of imagination or hallucinations.

XXX

FRAGMENTS ON RELATIVITY

A. CLASSICAL AND RELATIVE MEASUREMENT

ALL scientific objects are assumed to be in motion. This implies that if we isolate any one object in its relations to those about it at an assumed instant, it would be impossible to find at the next instant any group of objects which have maintained the same relations to this object which they occupied at the preceding instant.

However, motion with which experimental science deals must be regarded as taking place in a field of objects which do maintain the same relations to one another, i.e., motion with which science deals implies rest; otherwise stated, motion cannot be measured except with reference to points which, so far as this motion is concerned, are fixed. For experimental science points can be fixed only with reference to objects occupying points, and motion is measured with reference to objects continuing to occupy the same points while the motion is going on.

The actual field of objects within which motion takes place for experimental science is that of the distance perception of vision. While actual or implied contact experiences provide the reality which distance experience implies, distances that can be measured are always in the form of visually determined space.

The measurement of motion, therefore, involves a field of objects whose motions with reference to one another can be ignored. Such a field is found in vision, within which no changes of position appear within the minimum visible, and whose period falls within that of visual discrimination, something like an eighth of a second.

Within this field a distance measured between points determined by objects at rest may be subdivided by indirect proc-

esses beyond the limits of vision, but the whole measurable distance lies between points which must be *minima visibilia*.

Any measurement of velocity involves time as well as space, that is, we must know the relative dates at which the body leaves a point and at which it arrives at another point. If this measurement is to be accurate, the dates in perception of the objects that determine these points must be identical with those of the time of departure and the time of arrival. As long as the size of the objects measured and the rate of motion lie within the range of vision, this is the case. Where this is not the case, e.g., when we are measuring the velocity of light and are dealing with the bodies and the changes which are the conditions of vision, these dates are not identical.

The date of all visual objects in a field of vision is that of the incidence of the wave on the retina of the eye, or on the photographic plate of a camera. We may correct this date if we know the position of the object and that of the velocity of light, as we do in the case of the vision of stars; but, if we have to determine experimentally an unknown velocity of such an order, the determination must be undertaken with reference to objects occupying points in a visual space, and the points of departure and arrival will have the dates of the incidence of the wave of light upon the retina or the photographic plate, while the occupation of these points by the moving object will depend upon its velocity; and, if the size and velocity of the object excludes it from the field of vision, there will be no means of dating it as it leaves or as it arrives.

There would seem, therefore, to be an experimental error that attaches to all experimental determination of velocities of a high order. This error is, however, a function of the velocity of light, for the difference between the dates of the terminal objects and of the moving object depends upon the time that it takes light to reach the retina or the photographic plate. Could, then, the velocity of the object be affected by a coefficient containing some expression of this velocity of light which would correct this error?

In the measurement of the velocity of light, experimentally, the procedure is of the following general type. The light to and from a measured distant object passes through the aperture in a revolving wheel. By increasing the velocity of the wheel it is possible to shut out the light wave. The explanation of this is found in the length of time consumed in the passage of the wave, and a calculation of the velocity of the revolution of the wheel enables us to determine the time which the wave takes in reaching the wheel. The waves that leave the distant source are a composite of the action of many vibrations of particles at different positions and are moving with reference to one another, but all lying within what we call a point of visual space, i.e., within a minimum visible, from which the distance is measured to the wheel. Thus by making the distance between the source of light and the wheel great enough and the velocity of the wheel great enough, it is possible to obtain visual effects which reveal the velocity of light, although this velocity itself falls far beyond the field of visual discrimination. The interferometer enables us to enter the minimum visible of the source light and, through the interference of waves of light, to recognize the difference of distances of the sources of light which lie beyond the range of visual discrimination. In these cases we are determining by indirect methods distances which lie beyond the range of visual discrimination but between objects that are assumed to be at rest at points in a visual space. We are still assuming that these objects are or can be at these points, indirectly determined, at the same moment, that is, simultaneously with the other objects at rest in this space, and all the visual effects that can take place in this space must conform to this assumption, otherwise points would become lines and lines surfaces.

The determining factor in the situation is the succession of events. If a body is at rest in a certain spatial situation, the event which succeeds is one in which the body is in the same situation with reference to all other bodies that are at rest in that situation. If it is in motion, the succeeding event is one in

which these relations have shifted. If one were outside the earth watching the Michelson-Morley experiment, the points determined by objects resting on the earth would be succeeded by those objects in different relative positions to the other planetary bodies, and the points would become lines. The question as to what events will succeed is answered by the position of the retina or the photographic plate with reference to the situation. And what holds for objects at rest will also hold *pari passu* for objects in motion, i.e., the positions that succeed will vary according to the position in which lies the object of reference, whether it is the retina or the photographic plate. In the visual space of the surface of the earth, which includes the object of reference, the relative positions of the vibrating electrons which determine the light wave will be such as will allow points to remain points and lines lines, that is, they will be such that the light wave from each mirror will have the same distance to travel.

Against this position stands the classical doctrine which assumes that the process of the transmission of light, which is itself the condition of visual spaces, is one in which the succession of events is fixed independently of any object of reference. This comes back largely to the conception which we entertain of the space of the stagnant ether, which is supposed to have this character. It is easy to see that there are two implications here. One is that the space determined by the stellar co-ordinates is that into which ultimately the findings in all other spaces should be translated. Here are found the ultimate points determined by their occupation by bodies at rest, the ultimate lines actually or conceivably traversed by bodies between these or other points determined with reference to these points. The points, lines, surfaces, and volumes of other spaces are only apparently such. It is confessedly or by implication assumed that such points can be derived from the reference of all points of observation. But, while for the observation of the astronomical observatory such co-ordinates can be fixed with sufficient definiteness to secure uniformity of results, there is no stellar body

that is at rest at any point, and there is, therefore, no structure of points with reference to which such a space can be presented, even by the supposition of a body at rest, α , which could be made the organizing center, for there is no way of locating α . For the purposes of visual observation the fixed star does not move relatively to other fixed stars, but refinement of reference to the observations of long periods of time has elicited their actual movements, and the spectroscope reveals them indirectly as in present movement—and our astrophysics demands that we take account of this movement. What we actually have, therefore, is a space of astronomical observation, fixed by the co-ordinates of stars which for that observation do not move with reference to one another, with the recognition that for the purposes of the study of the movement of these stars we are in the same position as that in which we find ourselves in translating our daily Ptolemaic perception into the recognized space of the Copernican hypothesis. There is no absolute space, only an indefinite number of spaces of different co-ordinates, the structure of which can be translated into one another, and the question is shifted to the constants which make such translation possible.

The other implication of the classical doctrine is that of the stagnant ether. Here we have a body at rest, and its different parts seem to serve the purpose of determining an absolute space, or at least the conception of one, even if we find ourselves before the hopeless task of distinguishing different parts of this ether so as to determine the different points for the construction of the absolute space it occupies. However, just as the earth reveals itself as occupying the stellar space in the Foucault experiment, so the passage of a wave of light ought to reveal its occupation of the space of the stagnant ether in the Michelson-Morley experiment—and the experiment has failed to exhibit this evidence of the space of stagnant ether.

We still assume that a train traveling along the line of the earth's orbit covers a greater distance in a given time in stellar space than a train traveling at right angles to this train and

with equal tellurian velocity; and, if we had apparatus which could detect differences in the velocities of these trains as parts of the earth, it would exhibit the one train as traveling faster than the other. Such an experiment would be of the same order as that of Foucault. That is, the reality of the different succession of events in another space, which is determined by this particular succession of events, would reveal itself in the earth space by an addition of velocities through an appropriate apparatus. If we state this in terms of the different succession of events, it implies that there is a space-time within which the train is moving such that the position of the train at any one moment will be succeeded by a position of the train which will be different from that which succeeds the first position of the train in the space-time of the earth. The failure of the Michelson-Morley experiment to exhibit evidence of the movement of light in a space-time independent of the bodies that move through it seems to indicate that, if we were able so to place ourselves in the process of the transmission of light that we could be at rest there while objects moved by us with the velocity of light, there would be no one succession of events which would be the same in every space, but that there would be in each space-time a succession which answers to the structure of that space-time, i.e., the space-time of the earth, in which the distance traveled between the two sets of mirrors of the Michelson-Morley experiment would be the same, and the space-time outside the earth, in which the distance traveled between the two sets would be different, owing to the earth moving with the one wave. Another way of expressing this would be the recognition of a uniform velocity of light in every space-time.

If we assume that the velocity of light remains the same in all space-times while the events that succeed one another in two space-times differ, it would follow that this difference between the events must exhibit itself in different spatial and temporal values when we undertake to transform that which is taking place from one space-time to another. If the velocity of light remains the same on the earth and in stellar space, and yet the

distance traveled on the earth between the sets of mirrors remains the same, while in stellar space the distance traveled is different, then from the standpoint of the earth the corresponding distance must be shorter and the time longer if we would transform them from one system to the other.

The determining factor in this difference in the succession of events is the velocity with which one system moves with reference to the other. This velocity is not one that is determined by an outside observer who regards both, but one which is conceived of as recognized by each. If we assume an outside observer, he would be in another system which must be assumed to be in motion with reference to the other two, and the same problem would arise with reference to the comparative velocities of all three systems. To say that one system is moving with reference to another is to say that an event—every event by implication lying in all systems—is succeeded in one system by a different event from that by which it is succeeded in the other. When the objects within the systems lie within the range of vision, the velocities can be calculated, and with opposite directions the velocity is the same in both systems, e g., in the case of the landscape moving by the passenger in the train while the train moves by the observer at a station. To determine velocities, it is necessary to determine simultaneities between the moving objects at points which are occupied by objects at rest. This takes place in vision, in which, as we have seen, all objects at the points seen have the identical date of the incidence of the light wave at the retina or the photographic plate. Those objects which retain the same relative positions are at rest, while other objects are in motion. We can correct these dates by the velocity of light, but it is important to recognize that the corrected positions at which the objects are placed by calculation are determined with reference to positions visually given, that is, they belong to the space-time of the object of reference.

It is, perhaps, not amiss to call attention to the obvious fact that the reference is not solely to the retina or photographic plate but to these and their fields as mutually determining each

other. It is true that the passenger in the moving train may now see the landscape rushing by him, and again at rest while his train rushes through it. In the latter case the organized structure of the landscape, especially at considerable distances, enables him to place himself with reference to this and to correct the repugnant impressions in terms of the moving train. It is also not amiss to refer again to the fact that our visual objects always exist in terms of the contact values which they would have if we carried out the reactions which as distant objects they suggest. This inevitable correction of vision by contact finds its recognition in theories of relativity in the reference to the rigid measuring rod, but one must not overlook the fact that the dimensions even of a rigid measuring rod belong to a visual, or more generally to a distance, system. The rigidity of the rod insures its retaining its dimensions within this system; it does not offer dimensions independent of this distance system, out of which such a system might be constructed. To any group of objects that retain the same positions with reference to one another an observer can actually or in imagination place himself in the relation of simultaneity. This is attained, as we have seen, in the attitude of vision, in which all objects have the identical date of the incidence of the light wave upon the retina. If this is accomplished, as in the case of the passenger in the moving train, the events that succeed are different from what they would have been if he had not taken this attitude. As the order of succession of events is different, the time systems of the two situations may be said to be different. Difference of time systems here does not signify different rates of passage of events but the succession of different events. This simultaneity is an expression of the fact of distance experience. It is visual in human experience because of the actual, or, if one prefers, accidental, development in the human animal of a highly refined and accurate apparatus of visual distance experience. The congenitally blind individual does not lack the experience of simultaneity. Objects exist for him as simultaneous with himself, but none of the experiences of sound, temperature, or contact of

waves of air offers the definiteness and refinement of dimensions of simultaneous objects which belong to the world of normal vision.

If we undertake to determine velocities in another system from within a given system, this can only be done by obtaining simultaneities of events in the other system with these in the given system. For the purposes of this determination the events of the other system must become members of this system, unless one can, as in the moving train, actually shift from the system of the moving landscape to that of the moving train. In that case one is not determining the velocity of one system by means of simultaneities of objects in the other system with those in one's own system. One has passed from one system to the other. Assume, however, that within the train the passenger is undertaking to estimate the velocity of the train moving through the landscape by means of a calculation of the distances measured within the train that are coincident with stretches of the landscape. He identifies an object without that is coincident with the edge of a window and an object that is coincident with the edge of another window. He has measured the distance between these two edges and assumes that the outer distance is identical with the inner distance. If now he notes the time at which the first object has been coincident with the farther window edge, and the time that the second object becomes coincident with the same edge, he has while remaining within his own system measured the time it has taken the train to cover that distance in the other system, if the further assumption that the time systems are the same be allowed. If we accept the fact of vision that all seen objects are at the moment of vision simultaneous, his calculation within this visual world will be correct. The moment, however, that we take into account the time that elapses in the passage of light, a minute error is introduced. His identification of the outer distance as coincident with the distance between the two window edges has been made while the train is in motion. He moves to meet the light wave that comes from one window and away from that which comes

from the other. If the velocity of the train is uniform, the advance in the advent of one wave will be equal to the lag in the advent of the other, if he was situated midway between the two window edges. He estimates the velocity of the train, however, by the time that elapses between the advent of waves both of which come from outer objects that are coincident with the same window edge, toward which the landscape is advancing. The advent of the light wave at his eye will in each case be shorter than that which would have been the case if he had established himself in the other system, midway between the two outer objects. If, to avoid a further complication, we assume that coincidence is registered by an electrical contact that lights electric bulbs within and without, the man within the train will calculate a greater velocity of the train in the other system than he would have calculated if he had been actually located in that other system outside the train. In making his transformation, he will have to assume that times are longer without, i.e., in the system that seems to him to be moving, than within. Also if he notes the point in the landscape at which he is when the light reaches him from the first coincidence, when he is midway between the two measured points, it will be closer to that point than the corresponding point at the center of the two measured positions outside the train which agreed with the measured positions within the train, for he has been moving toward this position of coincidence while the light wave has been coming to him. If he had been outside the train, this would not have been the case. For him within the train, then, the distance outside the train will be shorter than the corresponding distance within the train, by the distance he will have traveled while the light wave was reaching him. This shortening of distance and lengthening of time will depend upon the velocity of the train.

There is no way of determining a space of bodies which are at rest, except by the relative position of these bodies and other positions calculated from these and regarded as the positions of possible bodies. This involves distance perception, and the im-

plication of distance perception is that the bodies perceived exist where they are at the moment of perception. The immediate perception places them where they are perceived. This is subject to correction, as in the case of an object seen in a mirror, but this correction does not displace the bodies in perception. It is a further judgment that corrects the perception. The space of this consentient set (to use the language of the relativists) of bodies which are at rest is the space of experimental science, and all of the points so determined and objects occupying them have the same date—the date of the perception. All measurements of experimental science however refined must be made in this space. For this science the date of perception is replaced by the moment of incidence of light waves upon the retina or the photographic plate. All objects at rest in that space have this date, that is, are simultaneous.

If we retain this simultaneity of perception, and do not go behind it to take account of the velocity of light, none of the paradoxes of relativity arise. The estimates of distances and times remain the same in determining the velocity either of the train or of the landscape, as long as we abide by the simultaneity of perception.

When we take account of the velocity of light, the dates of all objects about us depend upon their distances from us, though we may have sufficient reason for assuming that they have remained where they were perceived. This dislocation we have just noticed in the case of the object outside the car in determining its distance from the observer within the car. The spatial structure determined by the relative position of objects at rest, however, remains that of the perceptual field. However refined the measurements are by which the positions of objects are determined, they still lie inside this space of experimental science, and its units are but subdivisions of this space. So long as we remain inside this space, no complications are introduced; but, when we take into account the space of another consentient set that is moving (i.e., a group of objects that retain the same relative position to one another, and would therefore be

at rest for a retina or a photographic plate, but do not retain the same positions with reference to this first consentient set), their motions with reference to the first consentient set at once affect their assumed positions with reference to the first consentient set, if we take into account the velocity of light. Within the first consentient set this is not the case, for we assume that, though some time has passed in the passage of light, the body at rest in that system is still at the point at which it was when the light wave left it, and the moving body, as long as it is regarded as within that system, can be accurately located by our knowledge of the velocity of light, provided we may accept its velocity in that system as determined experimentally, though we have seen this determination is subject to an error if we are considering an object whose dimensions and velocity lie beyond the discrimination of vision, for, the velocity being unknown and the body being indiscernible, we cannot tell when it is at any point in the space of this consentient set. The same error appears in determining the positions and velocities of bodies in another consentient set that is moving with reference to the first consentient set. For instance, what are the motions and positions of planetary bodies in the solar system, as determined by their positions and motions as given to the observer on the earth? If we take into account the velocity of light, the planetary body was not at the position it occupied when the light wave left it; and, as we do not know its velocity but are attempting to determine it, the accepted velocity of light does not enable us to place it. The error will vary with the velocity of the whole consentient set with reference to the earth. There are, however, certain conclusions which we may draw from the situation. Assume that A and B are two objects in the second system, or consentient set, which is being observed from the first, and that the line connecting them is in the direction of the motion of the second system away from the first. B is farther from the observer than is A. In the vision of the observer they are simultaneous. B has the same date as A. At the date of A, however, the light wave from B that arrives simultaneously

with that from A actually had left B earlier; or, otherwise stated, the wave that leaves B simultaneously with the wave from A will arrive at the retina of the observer later than that from A, as B is farther from the observer than is A. As the wave that reaches the eye of the observer from B simultaneously with the wave from A has always left B earlier than the corresponding wave from A, and as they are both with their system moving away from the observer's system, the position represented by the light wave from B will be closer to A than it would have been if simultaneous waves from A and B had reached the retina of the observer. That is, distances in the second system in the direction of the motion of the second system away from the first will register themselves either on the retina or on a photographic plate in the first system as shorter than they would be measured in the second system. Furthermore, the interval between A and B, as they move by a point in the first system, is the same interval as that of the passage of the point in the first system by A and B in the second system viewed or photographed from the second system, but the time of passage measured on the time co-ordinate of the first system represents the passage over a shorter distance, while the same passage measured on the time co-ordinate on the second system is a passage over a longer distance. If the identity of the passage of these two systems by each other implies that the velocity of the passage is the same whether one system is regarded as passing by the other, or vice versa, then the time interval in the first system must be longer than the corresponding time interval in the second. That is, while corresponding spaces will be shorter, times will be longer in the system which is regarded as in motion by the other system, and these differences will increase with the velocity of the system.

The crux of the difficulty, as the relativists assert,¹ lies in the difference in simultaneities that are involved in the relation of

¹ See Albert Einstein, *Relativity*, trans R. W. Lawson (New York, 1921), pp. 26 and 30-33; cf. also, Einstein *et al.*, *The Principle of Relativity*, trans W. Perret and G. B. Jefferey (London, 1923), pp. 38-40.

the simultaneous objects to different systems. Simultaneity refers to the maintenance of the same relative position of objects to one another during any duration however short. For a retina or a photographic plate within that group of objects, these objects will be at rest, or, in the language of Whitehead, they will be cogredient, if the duration is not shorter than that implied in visual discrimination. In the perceptual world, and that is the world of experimental science, simultaneity and rest are synonymous. If the velocity of light were not finite, we could also speak of objects in motion as being simultaneous with other objects at rest at the moment at which the moving object passes through a certain point. Objects at rest remain simultaneous even under the condition of the finite velocity of light, for, upon the supposition of rest, they have not moved during the passage of the light wave. Taking into account the time period of the light wave, a moving object is not where it is seen at the moment at which it is seen, nor, assuming that we do not know its velocity, can we calculate its position. If there are other objects that maintain the same relative position to it and one another, it will be simultaneous with them for a retina or photographic plate in that system, but simultaneity there will evidently have a different significance in that system from that which it will have in the other, and the consequences of different spatial and temporal measurements of the same interval in the two systems, which have already been noted, will result.

The crucial importance of the velocity of light arises from the fact that in the perceptual field of experimental science the distant object that is at rest, or is simultaneous with other objects and the observer, is a visual object. Other distance perceptions than that of vision carry the same implication but do not allow of the exact determination which vision permits. The space of experimental science implies distant objects that are at rest, otherwise that space could not be differentiated for the conduct either of the man of science or of the man in the street, and all that exists or takes place in the space of any one perceptual situation will have the dimensions which belong to that

differentiation. If we take into account high velocities that are comparable with that of light, or minute objects that cannot be located in this visual space, or both of these, dimensions will be subject to the error which has been developed above, and the statement of this error will evidently contain some expression of the velocity of light.

Recurring now to the Michelson-Morley experiment, we can say on the basis of this analysis that, while there is no contradiction in the appearance of optical effects which evidence the velocity of light coming from positions that may be regarded as occupied by an object at rest (since these would not run counter to the assumption of the system of objects that are simultaneous or at rest), optical effects which would reveal the fact that a light wave which left an object at rest and moved toward another object which belongs to the same system (that is, is at rest with reference to it) had reached that object in another position, would imply that spatial positions determined by objects at rest are not so determined, i.e., these optical effects would be in contradiction with the space within which they occur. This is just what would be the case if the interferometer revealed the fact that the path of a light wave from one mirror to the other is longer than the measured distance between these mirrors. This cannot be the case in the space of this system of simultaneous objects.

There is a fundamental difference between the Foucault experiment² and the Michelson-Morley experiment. Whatever explanation we may give of the revolution of the axis of the pendulum beat, the perception of it does not necessarily imply an extra-terrestrial standpoint, a stellar landscape. However absurd it may be to assume that the revolution of enormously distant stellar bodies is the cause of centrifugal motion on the earth, the assumption introduces no confusion into our consentient set.

Suppose that the Michelson-Morley experiment had shown

² See A. A. Michelson, *Studies in Optics* (Chicago University of Chicago Press, 1927), pp 125 ff

that the light wave that traveled from the central source to the mirror traveling with the earth covered a different distance from that which traveled from the same source to the mirror at right angles with this, but at an equal measured distance. There could have been no Ptolemaic statement of this, that is, there could have been no statement made of it in terms of our terrestrial perception, that within which, however we may interpret it, all the immediate findings of experimental science lie.

In the illustration given above, the revolution of the earth is represented in perception by the revolution of the heavens; and, if we are Einsteinian relativists, what is ascribed to one from one point of view will be ascribed to the other from the other standpoint. If the interferometer had revealed the evidence in our own space-time of this different distance, there would have been nothing in our space-time which could have answered to it. It would have been a brutal irruption of the space-time of ether into perception. There would have been no one to one correspondence such as subsists in the relative movements of two perceptual consentient sets. It would have been without precedent. For, while we can find a revolution of the sun with the heavens that corresponds to a revolution of the earth in the two consentient sets in the two space-times, it would have been impossible to assume that the ether of the revolving heavens revolved with it, since the ether of physical science is stagnant, and such a movement of the ether in the opposite direction to the movement of the earth would have been necessary to find the correspondent to the sought-for Michelson-Morley effect if it had been found.

The undertaking of physical science to state, within the field of distance perception, the process which makes distance perception possible seems to set up a space-time that is independent of distance perception, while it utilizes the space-time of distance perception for the undertaking. This undertaking encounters no serious difficulties so long as the dimensions of its hypothetical scientific objects and their motions can be stated in terms of the space-time within which the tests of the hy-

potheses must be made. The distance space-time of experimental science is visual, but we can subdivide this visual continuum not only beyond the minimum visible but beyond the dimensions at which an object could subtend a light wave, i.e., beyond the point at which even in imagination it could be a visual object, because these physical particles can still be presented to the scientific imagination as having the contact value of resistance, i.e., in terms of mass or energy, and we can obtain indirect experimental evidence of these values. By means of the location of these particles we can construct a space which endures a subdivision of visual space even beyond the limits of conceivable vision, and it is only by the relative location of objects at positions that a space can be constructed at all.

When we pass from a geocentric to a heliocentric space, or to a space of stellar co-ordinates, we still assume that experimental results obtained in a geocentric space can be used to test hypotheses built on stellar co-ordinates, although the spatial and, therefore, the temporal elements in the geocentric space-time are not identical with the corresponding elements in the space-time of stellar co-ordinates, i.e., a point in the one is a line in the other, and the answering temporal unit, by which is measured duration from point to point, will vary. Still, as long as there is a strict one to one correspondence between dimensions in the one space-time and in the other, the experimental results in the one will hold for testing hypotheses built on the other. Now such a one to one correspondence obtains as long as simultaneities in the one are simultaneities in the other, e.g., the conjunction of two stars for the terrestrial observer means the position of the two bodies at the same moment on the same line connecting them with the telescope, in the space of stellar co-ordinates.

As we have already seen, the conception of an indefinitely extended ether that is stagnant, or at least cannot be conceived of as belonging to a system that moves, say, relatively to that of the fixed stars, allows of no such correspondence between its space-time and that of other space-times. And yet, while such a stagnant ether would occupy its own space, it does not deter-

mine that space as a system of spatial elements, for ether, since the deliquescence of the vortex theory of atoms, cannot be regarded as made up of physical particles, and can therefore determine no positions. It occupies a dog-in-the-manger position. It pre-empt's a space but does not permit of its being used as the fixed space which it fills. Any positions determined in this space can only be relative to the system of objects, determining these positions, and any other system of objects moving with reference to this system will determine another space. Of course, such a fixed space of ether is no space at all, for space is a system of distances between objects in some sort of a system. In other words, an absolute space is a contradiction in terms. It is a denial of the fact that is involved in the very nature of space that there is or may be a set of objects so organized with reference to one another that they are simultaneous with one another, that is, are at rest, but which are or may be moving with reference to another system. Admit this, and one admits at once that the spatial relations in one system will be different from what they will be in their relation to the other system. In a terrestrial system a clock tower remains where it is from one hour to the next. In the solar system it is 70,000 miles away from where it was when the clock struck an hour ago. An absolute space is a denial of temporal perspective, and by the same mark there is no such thing as space; there are space-times.

If the looked-for effect had appeared in the Michelson-Morley experiment, it would have appeared in terrestrial space-time, i.e., the actual interference or reinforcement of light waves in certain definitions of spatiotemporal extension would have been an integral part of the terrestrial space-time and, as such, could have been translated into the space-time of the stellar coordinates, and in this translation their spatial and temporal dimensions would have been different. Such an assumption runs counter to the presuppositions of ether and its space. The looked-for Michelson-Morley effect would be one that appears with the fixed spatiotemporal dimensions which belong to the absolute space-time of ether and would be the same in every

space-time. This may be expressed in two ways. Either we may say that the theory of ether implies that in every space-time it is stagnant, while what is at rest in one space-time must be moving in another space-time, in our actual experience; or we may say that as it is in a visual space that we determine the simultaneities of objects in other space-times with those in our own, and that in the other space-times simultaneities with our own are determined also in a visual space, and since we are able to translate successfully from one to the other notwithstanding the different spatial and temporal configurations in different space-times, the velocity of light which is essential to determining the positions of objects must remain the same, though the relative dimension of the spatial and temporal units for measuring this will vary from one space-time to another. That is, the space covered and the time elapsed in the passage of a light wave from an object in another system from ours to our retinas will have a uniform ratio to each other, though the spatial units of measurement in the other system will be shorter than they would have been if that system were at rest, i e., were a part of our own system, and the temporal units will be longer.

As has been already stated, if we could maintain the attitude of visual perception of the simultaneity of all objects of vision, all having the date of the incidence of the light waves upon the eye or the photographic plate, there would be no difference in the spatial and temporal units in different systems in the case of any perceptual velocities.

B. MEASUREMENT AND ACTION

Measurement of duration takes place through motion. It is of either the spatial or the temporal aspects of the duration. The fundamental character of measurement is the repetition of an act which is functionally equal in its durational content in the different repetitions. The most elemental illustration of this functional equality is found in the rhythmical motions owing to our bilateral symmetry. We get ahead by moving first one side of the body and then the other. To reach a distant goal, the

motion of one side must equal the other. The equal pulls on each side of our organism, owing to the equal stimuli which the two sides of the environment exercise upon us through vision, is another instance. It is the equality of these pulls which assists us in preserving our balance in an erect position. But beside such rythmical functionally equal steps there is implied in measurement a durational extension toward the goal that extends over all the steps and to which the steps as such are functionally equal, i.e., they run through in the rhythmic process (in which each step is functionally equal to the one before it and the one succeeding it—and thus all steps are individually equal to every one) the extension which appears in experience through the location of the persistent object with its content of an inside. The fundamental relation of betweenness exists in experience through the establishment of this distant location and the consequent organization of the environment with reference to this goal. There is, then, a functional equality of the steps that reach the goal and the pre-existent distance given in the distance experience. While the steps ultimately exhaust the distance experience, the number of steps required is not given, nor is there in this relation any functional limit set, i.e., there is in the situation what answers to indefinite divisibility. Assuming a number series established through the relation of betweenness, and different series of steps functionally equal to the same distance experience of a given goal, there is no limiting number involved in the distance extension, or consequently any ultimate step. Whatever limit is set up must be found in the other characters of the steps besides those of so-called extension, i.e., the point is not inherent in the extensional relations. Such a step is the unit of measure of the distance extension, and the functional equality of different series of steps is given with the possibility of an indefinite number of units of measure.

The collapsing of the act through the identity of content in the interior of the distant object and in that of the physical organism abstracts the spatial content of extension and sets up a space of the moment, to which are referred the steps which

measure it. This leaves the temporal phase of extension as a content which is not involved immediately in this measurement of the spatial extension. While the temporal phase is abstracted from in this process of spatial measurement, it is always present in the process, and, when recognized, the relation between the two becomes that of velocity when it can be stated in units. And this involves a temporal extension which can be correspondingly measured.

This temporal content cannot be collapsed as can the spatial content. It arises in experience out of change over against the object which persists. The functional equality of the steps does not carry with it a functional equality in the same sense as it does in the case of space. As the preservation of the physical organism moving in a straight path toward a goal calls for uniform velocity in the taking of the opposite steps, there is a functional equality in the times of these steps, but the continuum of duration which is broken up into equal units by the process and the units themselves are not there for comparison as are the spatial steps and the spatial whole. There is the nicest sort of adjustments to the different temporal intervals involved in meeting and avoiding objects. But as durations pass in their very nature it is impossible to hold on to them for comparison and determination. What takes place is that we come back to the experience of uniform velocity that we maintain in bilateral movement made up of functionally equal steps and break up the distance covered under assumed unaccelerated velocity into equal parts to which we assign equal temporal elements, while our instruments of precision in time measurement are fashioned to produce functionally equal steps, such as the swing of the pendulum or the vibration of an electron; but we can never recapture the duration passed to compare its extent with the steps taken, or the steps to compare their extents with one another. Time measurements depend upon an assumption of uniform velocities that can never be made to be actually congruent with one another. However, this seeming advantage of the spatial content over that of time loses its foundation with

the abandonment of an absolute space and with the recognition that what has appeared as an absolute space is only that of the collapsed act belonging only to the space of the duration in question. The act does not take place within a given space, but the space of measurement is an abstraction from the act in so far as in perception it is collapsible. Distance experience, notably that of vision, extends this space of the momentary act indefinitely, until we assume it to take in the whole of the universe at the moment. As this space is relative to the organism and its act, spatial elements, points, lines, surfaces, and volumes preserve their character only for this space. The same elements from the standpoint of another organism, or the same organism at a later moment, may be fundamentally different. These spaces thus pass with durational experience, and the same problem of obtaining congruence between the elements of the space of one duration with those of another arises which appeared in the case of time.

The possibility of reaching a congruence of the space of one duration with that of another appears in the tendencies to different acts with reference to the same distant object, e.g., reaching and manipulating in different fashions the same object. These acts would involve different durations and different velocities. As we approach a distant object, the object of one moment has passed away before we find ourselves over against the object of the next moment, and a congruence of these objects is impossible. The identity of the object as a collapsed act in the whole process does not in itself give congruence because the inner content of effort or resistance may be variously defined spatially; but, if the action, such as dividing the object, either takes place under our hands while we are regarding the object or takes place imaginatively, the two processes of locating the thing before us and of dividing it intersect each other. This amounts to the familiar experience of operating either actually or imaginatively upon something which persists, while the operations stretch into the future and imply different moments which still are presented in their results as existing in the nature

of that which belongs to the now. The now is that of the present duration passing on in a period of the so-called specious present at a certain rate. There arises in particular a certain terrain of objects, which Whitehead calls cogredient with the percipient event, and which have the same date with the organism as a physical object. If we undertake to state this rate, it would be stated in terms of the so-called passage of time and in terms of our watches or the movement of the sun. Within this field other things are happening at different rates. Within the limits of two events, such as the position of the watch hands at nine or the position of the sun at a certain point in the heavens, and the later position of the watch hands at twelve or the corresponding position of the sun, from the point of view of a so-called fixed environment nothing happens. This would represent the immediate nature within which the individual is placed at rest so far as the location of his body is concerned. The events in this system (we will call it a time system) would be the mere tickings of the watch, or the passage of the sun. Within this static environment let us suppose that another individual paces off or marks off with a yardstick a portion of the environment; then there will be with reference to the individual at rest this portion simply elapsing at a slow rate of the ticks of the watch, or the motion of the sun. There will be from the standpoint of the other individual a series of relatively rapid motions or events affecting this portion but lying within the same limits of the original and final positions of the hands on the watch or of the sun at nine and at twelve. If the individual at rest watches and follows, with his vision and tendencies to move, the action of an engineer, there will be within his spatial environment divisions introduced by the engineer's pegs. This individual at rest will then have two distinct attitudes, one that of inert passage of nature from minute to minute, in which the nature of one minute will have passed on and will not be there to be congruent with any discerned elements of the next minute. That is, if we assume the almost impossible individual entirely at rest in his relation to the passing of nature and of himself, no order could

be introduced into space which could have a persistent character. To attain order in space, or an ordered space, there must be coincidence between the event of a mere passing nature at rest and a series of more numerous events lying within the same limits. That is, we must have a coincidence of a stretch which is a single event passing on and a series of events which is a 1, 2, 3, . . . within the same extension. Within a single duration, say, a specious present, there is an unbroken event at rest but elapsing, and a rapid series of events that coincide with it. If two time systems represent two different series of events, different in number, filling out the same extension, then order in space is dependent upon the intersection of two time systems in the same extension.

There are, then, two ways of conceiving of timeless space. In the one case, one assumes the state of rest which represents the space of the spread that is cogredient with the percipient event or organism, and in this case the moments intersecting the event-particle will fall into three classes, standing for the three dimensions of empirical space. There being no fourth class, the event-particle is uniquely determined. The other case is that in which no state of rest is assumed, and, in consequence, no direction of motion can be determined, no order can be introduced into the space, and no determined simultaneities exist anywhere. As the spatial character of extension, which is spatio-temporal, answers to simultaneity as distinguished from the passage of duration, the absence of any determined simultaneity would answer to a negative account of a curved space or an n -dimensional space or both. This would answer to nothing in nature, but seems to be the implication of a space in which more than one line can be drawn through a point parallel to a line, or one in which the angles of a triangle are not equal to two right angles, as in the geometries of Lobatschewsky, Bolyai, and Gauss, and the bizarre geometries of more recent speculations. It seems to be also the background of the doctrine of Einstein, who assumes a situation in which an individual introduces his own co-ordinates of space-time into such an indetermined exten-

sion. It seems also to be the implication of Einstein's use of the tensor in his mathematical treatment of the problems of physics. So far as my feeble understanding of the tensor goes, it seems to indicate certain physical characters or factors of motion which may belong to a point irrespective of any determined relation to any spatial order. The linear elements of motions answering to these characters are calculated on the basis of a Euclidean geometry, with infinitesimal distances, and can then be related to any spatiotemporal order consequent upon any frame of reference.

C. VISUAL SPACE AND SIMULTANEITY

In case objects are all where they are at the moment of the incidence of the light wave at the retina, all objects and the spatial locations of these are simultaneous. This amounts to making the velocity of light for the immediate perceptual world infinite; and, if it is infinite, the ground for the difference in spatial and temporal units in a system which is moving with reference to another system disappears. There could be translation from one system to the other without error.

Classical mechanics presents a world analyzed in terms of visual space. The content of the body, which represents the contact experience which visual experience promises, is stated as mass, and mass is defined as the quantity of matter. Quantity of matter is determined by its volume, a function of visual space. However, another element enters, that of density, and densities vary in the same volume; but, by taking a standard density, such as that of water, it is possible to present physical changes in distance experience in terms which are all geometrical units, including, of course, the vector elements of dynamics. The simultaneities are those of visual experience, it being assumed that bodies that maintain the same positions with reference to one another continue to occupy the same positions in space though the velocity of light is a finite quantity. The simultaneity of the elements of a seemingly permanent visual space is given in advance of the changes that are plotted and

calculated in it, and also in advance of the experiences of push and pull, of stress and strain, which as contact experience constitute the fulfilment of the promise of the distance experience which is organized in visual space. What is taking place within a distant volume is assumed to have the same temporal dimensions as the volume which is simultaneous with all the other volumes, light waves from which reach the retina or photographic plate at the same moment. This assumption breaks down with the discovery of the finite velocity of light. The corpuscular theory of the transmission of light promised a refinement of visual space which would still have maintained the simultaneities of the gross and fine structure of things. With the defeat of this hypothesis came ether as another physical object filling all space but incapable of analysis into geometrical parts. Our experimental science operates in a space of simultaneous objects and is organized only through these objects. The expression in physical science of this simultaneity is that of the incidence of the light waves upon the retina or photographic plate. If this simultaneity were pushed back from the retina to the objects themselves, it would imply the infinite velocity of light. The space, then, of experimental science is built upon the assumption of the infinite velocity of light.

If the object is at rest, if it continues to maintain the same spatiotemporal relations with other objects in the consentient set or system, the difference in date between the departure and arrival of the light wave does not affect its spatiotemporal determination. For all intents and purposes we can say that all objects at rest have the date of the arrival of the wave at the retina or the photographic plate. When the object is in motion, we can no longer give it the date that belongs to it in the visual space, all of whose positions have the date of the arrival of the waves of light at the retina.

In order to determine its velocity, we take a reading of it at one visual position and then a second later at a second position and measure the distance. But where it will actually be at the moment when the light wave from it reaches the retina

simultaneously with the light waves from all objects at rest in the system depends upon its velocity. If its velocity has been very considerable, it may be measurably beyond that point. We could locate its position only in case we knew the velocity, which we, in fact, are trying to discover. The problem takes on the form of securing some formula such as the Larmor-Lorentz transformation, which will correct the errors in the determination of such velocities. These transformations were obtained from the Maxwell equations in the field of electrodynamics, which had generalized the Faraday conception of tubes of force into that of fields of force. It does not seem to have been recognized that this conception, which is implicitly present in the assumption of instantaneous action at a distance of mass attraction or the infinite velocity of the action of this force at a distance, undertakes to establish simultaneity in space at a distance in terms of mass or electrical energy, i.e., in terms of contact as distinguished from visual experience. The easiest imaginative presentation of this is in the form of stresses and strains, and Maxwell did work out the mathematical doctrine of such stresses and strains in an ether, which was adequate to the expression of fields of force in electromagnetism. As, however, no other characters of a physical substance, such as are implied in stress and strain, could be identified, the account of what takes place in the ether reduces to mathematical expressions for an energy situation in one object, and the corresponding energy situation in another object, with the assumption that at any point betwixt and between the two objects an answering energy situation could be identified if any object were there. These objects or systems of objects are simultaneous; but, if we attempt to state this simultaneity in terms of the minute subdivisions of visual space, we find ourselves in the position of locating an object at a point which it was not occupying at the date of that spatial position. The simultaneities of a visual space cannot be assumed to be those of the physical system that is assumed to be the condition for the appearance of the visual space. The field of force, on the other hand, is the expression of

a simultaneity between objects surrounded by such fields, that is, not dependent upon any such phenomenon as the identical date of the incidence of light waves.

The simultaneity of vision is that of a coincidence of effects, found in the incidence of various light waves upon a retina or photographic plate. The visual objects as causes of these effects have different dates, when we accept the finite velocity of light, and the problem is to locate them according to these dates in a space which is visual in the sense that all its determinations of position imply the presence of a visual object at the position in question. If we place a star or an electron in a position from which it was the causal antecedent of the visual effect, it is still a star or an electron at that position. If we state it in terms of energy, we are assuming a system of things which are there irrespective of any process of relating these things at a distance to organisms, though no such system can be presented except with reference to some perspective, to some perceptive event or organism. It is only in contact experience that we have perception of objects without an outer medium and without some process connecting the object with the organism. Force is the physical expression of what in experience we refer to as push and pull, or stress and strain. It is the feel of a connection with something that is not given in tactual experience. There is no direct perception of that which is, so to speak, at the other end of the pull or strain, or of the system of things which are responsible for the stress. What is present is effort which looks toward a future, while light involves a past, an elapsed period of its transmission. We have, in other words, that which is causal, as distinguished from the effect, so far as this is given in immediate experience. This system, however, cannot be given except in terms of things which are already related to the organism, because the feeling of effort does not give the object or system but merely the action which the system interprets. Force does not and cannot locate and define objects at a distance. For this we are thrown back upon visual space and its objects. The simul-

taneity, then, of an energy system is a statement of action going on in a system that must be visually defined.

In visual space the minimum visible is a point, i.e., it is without extension and has position. When we magnify this minimum visible, we are substituting another space for the minimum visible in another visual space. The substitution is by means of inference. We cannot actually make the magnified image fit into the whole space of unarmed vision, nor can we extend the magnified image to take in the whole of space. We come back to other points which are *minima visibilia*, and which answer to possible contact objects whose location, in case they are moving, cannot be identified with their visual location. Even if we carry this process on indefinitely in imagination, we are in visual spaces and therefore always temporally behind the contact objects which we regard as the causes of the visual experience. Otherwise stated, we are always presupposing bodies which have earlier dates than the visual objects and objects which cannot be placed in this visual space, for the visual point will answer to some line which will correspond to the distance which the body will have traveled while the light wave is reaching the retina. If we pursue this process of magnifying down to the electron, reaching the galaxies which physical theory presents in its hypothesis of the electromagnetic doctrine of matter, we reach a situation in which the bodies could not subtend a wave of light, that is, could not even for an indefinitely magnifying eye be a minimum visible, or visible at all. The question arises: Is the space of the electronic atom a visual space? So far as the imagination is concerned, it evidently is. We present models and subdivide the distances of visual space, but in the same fashion as that in which we make use of the microscope. We see before the mind's eye a galaxy of electrical particles, whose distances from one another are not visible, but which stand for minute fractions of the minimum visible. We conceptualize this space and seem to escape from the bondage of the eye. The visual model of the scientist's imagination answers

to the somethings which are the conditions of the visual experience. But even the conceptualization of this space must take its structure with it into its minutest details, for a conceptual space is nothing but the statement of the spatial relations obtaining between things. It does not relieve the spatial elements of their temporal coefficients, their dates. The space occupied by a glowing minimum visible may be reduced down to vibrating or streaming electrons. It continues to have the date of the glowing particle. We cannot catch the electron in its net, for the electron's movement has carried it out of this space, and the points of this space represent lines in the space of the electron. If we are to reach the space of the electron, we must get at it in terms of its elements which have dates, and hence spatial positions, which are independent of the dates of the visual consequences of what goes on in the electronic space.

Such a space has no perceptual points. There is no limit to the subdivision that may go on within it. This subdivision is unlimited, and it approaches no limit. We introduce limits only by taking some physical constant which obtains through any series of a continually subdivided object or system of objects and asserting that this must obtain, therefore, at the limit of the series. The series does approach a limit, though it never reaches it. The space ideally occupied by this limit would then be the point of this space. If we abandon the simultaneities of visual experience, we come back simply to a happening or an event which appears in experience as a feel. It has spatial and temporal characters, it extends in both senses, and it extends over happenings or events which are thus parts of it, and there is no theoretical limit to the partial events which it covers or to the more extensive events which cover it. Thus the feel of twenty seconds covers the feel of all the seconds, and, if we had a feel of a whole minute, would in turn be covered by this latter. The feel that is the content of the event is that sense of pressure, of pushiness, which is the imaginative content in the physical conception of energy.

This method takes a constant out of a series affected with

quantitative characters which approaches a limit and locates that limit ideally in a series that is constantly descending but which approaches no limit, for a point as a spatial limit belongs to visual space. Its character as a limit of a quantitative series answers to the Euclidean predicate of "without parts." The other element in the definition of the point "without magnitude" refers to its occupation of space in a given system. Such a given system exists for perception only in distance perception, in the normal human experience in visual perception. There is, however, another method of determining position besides that of determining the relations of an object to other objects in a given simultaneous system of visual space. A man in a railroad train is in one space in which the succeeding objects in the landscape are the events that pass by. In so far as he keeps his eye on the more distant landscape, he is part of the space through which the train is moving. His immediate pressure experience belongs to both. It is a fact of contact which has its place in either space. It is an event which could be ideally reduced from the surface of his feet to any required minuteness of spatial and temporal extension. If we conceive of the extension of this fact as occupied by such an intrinsic element as was described above, we would reach not only this element but the whole series of simultaneous elements which would be in each system, in other words, a plane. If now, placing a ruler across this plane, we take into account another space represented by this motion, in the events which would be found in all these spaces we would have a line of simultaneous events. A fourth motion of a pencil would represent still another space, and a single element of a point, which could not be further subdivided in our three-dimensional spatial experience. In all the spaces there is an identical event of which there is in each a different succeeding event. That is, these different spaces answer to different time systems. In the train the flying objects of the landscape succeed one another. Identified with the landscape itself the succeeding parts of the speeding train succeed one another, while in the different motions of the hands we have either the

passage of the hand over the paper or the passage of the paper under the hand. In all these different space-times there is the identical event represented by the contact of the point of the pencil on the paper.

This event which exists in actual or possible contact is for experience the reality of the perception. The distant objects are promises of this experience. The identification of such an event as belonging to different space-times of distance experience enables us to give it position. Position, however, always implies relationship to other locations. There is no such thing as absolute position, and in a space-time these will be simultaneous, i.e., they will lie in an instantaneous space. The resting of the hand upon a table, or of the foot upon the ground, does give an approach to an instantaneous space within which different locations are there in their relationship to some central point or points with reference to which they are oriented. Certain locations are realized as more distant than others. The actual organization of such a space, however, involves an act which culminates in measurement. We cannot use the simultaneity of the contact experience for the structure of the space of conduct. This always arises in the relation of distance experience to the point of reference of contact experience, and as the determination of a location in distance experience implies the possible presence of a physical particle at the position, and since this physical particle must be related to the point of reference and to other positions by physical processes which involve time, the structure of a space can never be instantaneous. For the physical processes which locate the distant particles at a distance at least occupy a measurable time period. The distant portions always have different dates from that of the point of reference. Supposing that we have located a number of points by the intersection of four different time systems, these could be organized into an instantaneous space only by the location of physical particles at these points, and this involves, as we have seen, different dates of the particle which is that for reference and other points. If the physical process which connected these

points, in this case that of light, were infinite, we would have simultaneity; or, if we could date back the position of the particle by the time elapsed in the passage of the light wave, we could construct a simultaneous space. The velocity of light is not infinite, and the process of dating-back the position of the distant particle is subject to the error of its proper motion, while the light wave is reaching the point of reference, when we do not know its proper motion and have no way of determining it except by visual positions.

The fundamental fact in the spatially and temporally extended world is that what event succeeds another event is not determined by the nature of spatiotemporal extension. In other words, we have to look for the laws of change outside the geometry of a spatiotemporal world. These laws are empirically deduced from the behavior of the material objects that occupy the events. Furthermore, the order of the succession is not absolutely determined. It depends upon a point of reference. That is, the world that is there is subject to temporal perspective as it is to spatial perspective. What object will lie between the individual and the object of his distant perception depends upon his location. Location is determined within a field of simultaneous objects, objects that are simultaneous with the percipient object. These are objects all of whose spatial co-ordinates remain unchanged, while their temporal co-ordinate varies.

D. RELATIVE SIMULTANEITY

Assume that an individual stands beside a moving railroad train. The problem is to determine what events will fall within the field of simultaneity of the man on the platform as the train passes and of the traveler sitting within the train.

The statement is to be made in terms of events, without prejudging the question whether objects are themselves as objects timeless and only occupy events, or whether objects also pass and are therefore to be considered as events.

Simultaneity is the temporal property of nature that is there

over against a living form. It may be called the environment of the individual from the standpoint of the passage of nature. This property is dependent on that relation of the individual to his environment which is expressed in the so-called specious present, that pulse of existence in which passage is going on, in which therefore both some past and some future is there in that relation which is denominated the present. The extent of this specious present is not immediately determined either by the field or by the individual. Its edges are uncertain, and the temporal extent expands and shrinks. One's temporal grasp varies, and the changes that are taking place in the field and in the individual affect the spread of this specious present. Within certain gross limits that could be stated in terms of the outside limits of the apperceptive grasp, the shifts of attention determined by the changes in the field and in shifts in the act would presumably determine the spread of this specious present. The changes in the field that would affect this spread would depend partly upon the relation of the objects in the field to the act and partly upon the necessity of readjustment of the organism in maintaining its spatiotemporal balance in its own conduct. In both considerations we are referring to the securing and holding of the posture called for by the carrying out of the act. In running, for example, movement does not necessarily involve more rapid succession of specious presents. If dodging becomes necessary, such rapid succession would probably become necessary; or rapid change of the objects, especially if unanticipated, would involve this. Where mutual change of the field and the organism—or change of either—involves change in posture, a new specious present would probably appear.

The action of the organism with reference to the field calls for an attitude of rest, however short. Activity of the organism is always from the environment, where the organism for the moment holds itself at rest. The structure of the world in the specious present is, then, one that will hold the organism in balance while the next reaction is undertaken. The here-now will be that structure, the there-then an earlier or a later one

which lies outside the immediate specious present. The definition of a critical change of posture would presumably depend upon the degree to which habitual adjustment enabled the individual to respond to changes in the field or in himself or in both without shift of attention from a spatiotemporally distant stimulus. Where the action of the organism is maintenance of a posture in a field which is not changing, one specious present may pass into another with no sense of succession.

A consentient set is such a structure of the field that enables the organism to carry out its next reaction, and whatever (changing or not) lies in that field will be regarded as simultaneous with the individual. Such a consentient set may, in imagination, be extended indefinitely. In existence it extends only through specious presents, as they pass imperceptibly into one another or as they perceptibly succeed one another.

Let the man on the platform and the man in the train each regard a distant telegraph pole. The event in the telegraph pole, or that occupied by the telegraph pole, which lay in the level which enabled the man on the platform to maintain his balanced position would be simultaneous with him. Would the level which enabled the traveler within the train to maintain his balanced attitude include the same event? We will overlook the fact that any possible difference would be so slight that it could be only stated in decimals far removed from the decimal point. The question is whether the consentient set of the traveler as he rapidly approaches the telegraph pole will include the same event in that pole as that which lies in the consentient set of the man on the platform.

The difference lies in the fact that the traveler is orienting himself with reference to a moving landscape. The difference may be expressed by the fact that, if the traveler held his pencil upon a point before him, eventually a point which would be in the same level with the telegraph pole would occupy that point for the traveler; that is, the point-track at the end of the traveler's pencil would spread itself into a rect for the man on the platform. Does the traveler, in orienting himself with reference

to a landscape in which distant points are going to occupy points which are at rest with reference to himself, place himself in a level of events which antedate or postdate those of a man at rest in the landscape?

He is moving toward the waves of light that come to him from the telegraph pole; that is, the wave of light will reach him earlier than it would if he were at rest with the man on the platform. The effect then is as if the wave of light had started earlier than that which would have reached him if he had been at rest. In other words, it would be from an earlier event than that which is responsible for the vision of the man on the platform. If his orientation with reference to the surrounding landscape is through processes that take time, his levels of orientation will all of them be dated as if the stimuli came from events that were earlier or later than the events responsible for the experience of the man at rest.

This statement is from the standpoint of the man at rest, setting up the object in his experience as the actual object, and assuming that the same path is followed by the light wave which reaches both eyes, those of the man at rest and those of the traveler. It only seems to the traveler to come from an earlier event. The statement implies that it comes from the same event, its erroneous dating being due to the hurrying forward of the traveler toward the oncoming wave.

Against this assumption we can place the relativity of motion. So far as the relative change in position is concerned, there is no criterion by which to determine which is moving, the train or the landscape. If the landscape is moving, the light wave that comes from the part of the train that is opposite to the telegraph pole will seem to the man on the platform to be as much postdated as the light wave from the telegraph pole was antedated for the traveler. If we abandon an absolute space and an absolute time, i.e., if we assume that the fundamental fact is passage which affects spatial relations as well as events, that spatial relations must be reckoned between events rather than between timeless objects, that time is the relation of succession

of events, and that there may be different systems of time within which events succeeded one another in different orders, then the situations which have been stated as different private or psychical interpretations of absolute spatial and temporal situations may be conceived as existing in nature. In the case before us the different specious presents of the man on the platform and of the traveler are, then, real phases of nature, although the same events appear in each. In fact, of course, the traveler identifies himself with the man on the platform and experiences himself as moving, and he is able to do this because with any velocities which he is capable of perceiving the differences in the order of the temporal passage of events are imperceptible. If the traveler never descended from the train, and if its accelerations and decelerations were never immediately experienced, in his specious present the landscape would be flying by him and not he through the landscape, though he might have other evidence that the other succession of events was the accepted order and be able in imagination to place himself outside the train and see it fly through the landscape. In other words, he would be in our position as respects the relative movements of the earth and the sun and the other heavenly bodies. We cannot perceive the motion of the earth with the consequent staying of these bodies in the heaven, though we can imagine it. We can imagine this as readily as we can place ourselves on the ground and see the train pass, because it involves no paradox, i.e., there is nothing in the reversed order of events which involves a different order in our present experience. Such a paradox does appear in the Michelson-Morley experiment. Here the light should reach a mirror moving with the earth and return at a later interval than that in which it goes to and returns from a mirror placed at the same distance from the observer but at right angles to the axis connecting the first mirror with the observer. All the paradoxes of relativity come back to this—that, if under its assumptions we placed ourselves in the situation in which we assume the other system is moving, the relative order and position of events would not be the same as they are on the

assumption that the first system is moving. The relative position and order of the heavenly bodies are the same whether we assume a Copernican or a Ptolemaic order. The relative position and order of objects and the train are the same whether we assume the train is moving or assume that the landscape is moving. This is not the case under the assumptions of relativity. From the standpoint of relativity an event which lies in the time system of the man on the platform and in that of the traveler, the common event, say, when the traveler flashes by the man on the platform, is not simultaneous with the same events in the systems of the two men, though the difference is too minute to be recognizable. Because it is not recognizable, there appears to be no paradox when we place ourselves either in the train or on the platform. Consider the Michelson-Morley experiment. The space of the earth is determined by the consentient set of its observers, i.e., the co-ordinates of the earth are at rest, so that the distances between objects at rest remain unchanged from minute to minute. Stated in terms of events, so-called objects at rest occupy point-tracks and not rects. As the distances between the mirrors of the apparatus remain at the same distances from each other, and as the distances which light travels in this consentient set are the intervals between these objects or the parallel point-tracks which they occupy, there is no possibility of a longer period in the passage of the light between the mirrors set on one axis and those set on the other. From the standpoint of an individual outside the earth the light that traveled toward a mirror that was moving with the earth would have a longer distance to cover than that which traveled to the mirror at right angles to the axis of the mirror that was traveling with the earth. If these events had been regarded from the standpoint of his consentient set, in which the earth is in motion, the discrepancy which Professor Michelson sought would have appeared.

One determines simultaneity by reference to the co-ordinates of objects at rest in relation to the percipient individual. In terms of events the determination is with reference to the point-

tracks which the objects occupy, if the objects are not conceived of as passing. The point-tracks which extend through a specious present, or the points that are there, are simultaneous; also the lines in a permanent space which occupy point-tracks, or surfaces and volumes, would then be simultaneous. If a system, such as a railway train, is moving with reference to this system, the question propounded above is with what event-particles in this system does an individual in the train find himself simultaneous, if he does feel himself to be cogredient with the system of the landscape through which the train is moving.

Simultaneity is a relation primarily between a point-track and the moments of a time system, within which that point-track is a point. That a point-track should be a point within any time system implies that it has the relation of cogredience with the durations of that system, i.e., has a definite relation of "here" in these durations.

Assume now two time systems that intersect in a level, e.g., the time systems of the traveler and of the man on the platform. As the train passes the station, there will be a level of events which are in the time systems of each. Assume a single event-particle in this level, say, that under the pencil point of the traveler as he sits in the train with a piece of paper before him. In the successive durations of the traveler this lies in a point-track, i.e., constitutes a point in his timeless space. It also is an event-particle in the time system of the man on the platform, and there occupies a point-track which constitutes a point in his timeless space.

Being in different time systems this event-particle will be succeeded by different event-particles in each. These point-tracks will not coincide. The event-particle which succeeds that under the point of the pencil of the timeless space of the traveler will occupy another point in the timeless space of the man on the platform. As these points retain the same character of "here" in the timeless space of the man on the platform, the point-tracks will be parallel. The succeeding event-particles which occupy the point under the traveler's pencil will occupy points,

i.e., point-tracks in the time system of the man on the platform which will be parallel to one another. If we take into account simply these two time systems, the event-particles in question will occupy two different routes. In the time system of the passenger they will occupy the historical route of a point-track, while in the time system of the man on the platform they will lie in point-tracks whose points would constitute a "spatial" route.

E. VISUAL SPACE AND CONTACT SPACE

The selection of the distant object in visual space is a function of perception, which implies in the cogredient set not only the contemporaneity, or simultaneity, of the distant object as seen but also as possibly felt, i.e., measured. It is there where it is and when it is not only for the eye but also for the measuring rod, but its date for the organism or the photographic plate is the advent of the light wave, not its departure from the object. The date of the contact or possibly measured object is, however, that of the departure of the light wave from the object. If now we take into account the movement of the object within the period lying between these two dates, the seen object and the measurable object belong to two different consentient sets, both determined with reference to the same organism or percipient event. The determining date is that of the measurable object, i.e., that which is cogredient with the organism as a material thing. The object as seen at a distance gives us evidence as to this. Being in different cogredient sets implies that what is simultaneous in one set will be successive in the other. Thus, starting from the contemporaneity of Sirius with ourselves (and this is conceived in terms of possible contact, of mensuration), the visual Sirius is pushed into a distant future, i.e., the visual Sirius is contemporaneous with the Sirius which belongs to the present world at this instant, while the present visual Sirius is contemporaneous with a measurable Sirius of a distant past. Assuming that we know the direction and velocity of Sirius' motion, we can place the measurable Sirius in the space of the visual Sirius, but the same events in the visual Sirius will not

be contemporaneous which would be contemporaneous in the cogredient set which included the measurable Sirius of the percipient event of that instant. Nor is it necessary to seek illustrations in objects at stellar distances. Assuming movement of that which is seen, what we consider the physical object, i.e., that which is measurable in possible contact terms, cannot be contemporaneous with the visual object at the place where the visual object is and when it is, since the passage of the light wave takes time, and yet what we refer to as the reality in perception is the contact values implied in the distance values when and where they are. If space is absolute, it is very simple to work out the measurable values of the visual object in terms of this absolute space and date them back to the period that has elapsed between the light wave's leaving the object and reaching the eye, saying that the object must have had these measurable values at the moment when the wave left the object. If, however, space is nothing but the formulation of the spatial relations of successive events, these spatial relations will be different if the measurable object and the visual object are regarded from one standpoint as simultaneous and from another as successive. We find ourselves, then, with two consentient sets, one of these is in a space which is extended out from ourselves by the measuring rod, and in terms of this we can state the physical object at the date of the departure of the light wave; the other set is in a space of vision, and by the use of the laws of optics we interpret the magnitudes in this space in terms of the physical object from which the waves of light have come. In each of these cases we reduce the temporal extent until we may assume a simultaneity of events. If in the visual space we reduced this temporal extent below that required to allow the waves of light from the visual object to reach the organism, we would theoretically lose our visual field entirely. The velocity of light represents a lower limit to the reduction of the temporal extent within visual space; actually the limit is set by our ability to respond to visual stimuli. In our imaginative reduction of this extent within the measurable space we can conceivably go below this limit; other-

wise we would be unable to state phenomena of light and of radioactivity, i.e., events which would be simultaneous in the visual space would be successive in the space of the measuring rod. But percepts of distant objects inevitably exist in a visual space, even in our imaginative presentations of the movements of electrical particles. All of our apparatus used in measuring the velocity of light itself requires the discrimination of vision. A temporal limit which is lower than that of our power of response to the light stimulus implies spatial magnitudes which would have to be transformed to bring them within the visual field.

In the Michelson-Morley experiment, a light ray is split. One half travels to a distant mirror in the direction of the earth's motion in its orbit, while the other travels at right angles to this motion. The velocity of the earth is then added to that of the light wave on its forward path and is subtracted from it on its return. It should return later from the reflecting mirror than the wave that travels at right angles. The difference in the velocities of the waves should then be evidenced in interferences between the images that return. Why did this not take place? The mirror which is placed in the line of the earth's motion, as part of the measurable system of physical things that make up the apparatus, is regarded as there as of the instant at which the light wave leaves the source, but, when the light wave reaches it, it is regarded as having moved along with the earth which sustains the apparatus. When it returns from this mirror to the central mirror, it is assumed that this with the earth has advanced toward it, i.e., it has a shorter distance to travel. This implies a series of successive instants, such that the light wave, as a set of vibrations, can be located at successive moments as occupying different positions with reference to the apparatus, much as a swimmer may be located at different positions at different moments with reference to the banks of a stream. This would be theoretically determined by a measuring rod. But as a visual fact the light wave which reaches the central mirror on its return from the distant mirror has not only the date of its

arrival but also that of the distant mirror, for this exists as a visual object only in virtue of light waves which reach the investigator simultaneously with the wave whose velocity is being measured. As visual facts, the light at the distant mirror and at the central mirror are simultaneous. As measuring-rod facts, they are successive. Substitute for the eye of the investigator the photographic plate; then the date of all parts of the visual whole which appears there is that of the arrival of the light waves at the plate. Such a plate could not detect different velocities of light waves passing between different parts of the apparatus, since as visual facts they must all have the same date—they are all visually simultaneous.

Assume successive photographic plates or a cinematographic film; then one exposure would present the apparatus as the light wave is emitted, while, under the assumption of the varying velocity of the two split waves, successive exposures could conceivably record the earlier and later advent of the waves with varying velocity. A film lying between these might present the record of the interference of waves whose velocity varied but slightly. The experimental evidence that approaches such a case closely is that of the failure of a light wave to return from a distant mirror in time to pass through the aperture of a rapidly revolving wheel through which the light wave had passed on its way to the mirror. This is direct evidence of a visual sort that the waves that come from the distant mirror and which date its visual existence can antedate the wave that travels to the mirror and returns from it, and therefore that those of these two classes that do coincide or partially coincide must be of different dates, if we date them from their source. This implies, however, the ability to identify and follow in imagination the wave from the source on its journey to the mirror and back to the source again. A light wave cannot be personally conducted in this fashion in visual terms, for light waves are the antecedent conditions of all visual objects. It is only the measurable contact content of the wave that lends itself to such imaginative surveillance with the different datings

implied. It is only by inference involving such a reference to the light wave behind the visual scenes that we can interpret simultaneous visual contents as the result of waves of different dates. The immediate implication of interference is that of spatial differences in contemporaneous occurrences.

F. RELATIVITY AND PERCEPTION³

I have already pointed out that one character of the hypothetical or erroneous objects in the experience of the individual which is regarded as specifically mental is the uncertainty which attaches to the result which would follow upon the carrying-out of the inhibited responses which the distance stimuli in these objects arouse. It is impossible to give its proper reference to this mental character without taking into consideration the import of one of the important contributions which the doctrine of relativity has made to the knowledge of nature. This contribution is most definitely indicated in the recognition that there is no such thing as nature at an instant, nor any physical thing in nature at an instant; that an instant, an element of duration without temporal extension, is a fiction whose only legitimate reference is to the ideal of a limit implied in differential equations; that all extension is temporal as well as spatial, and there is therefore no space that does not pass. The order of events cannot, then, be fixed by a set of timeless positions in space, as one orders the movements of the hands of a clock by the positions of the divisions on its unmoving face. Spatiotemporal perspectives or situations are there, as are other situations, vital or perceptual, that determine their objects. The separation between time and space is, however, also there. We naturally appreciate change in its contrast with what does not change in the perceptual situation, by movement in an unmoving field, and time is a derivative of the movement and space of the field that does not move. That the face of the clock passes as well as the slow-moving finger of time cannot be gainsaid,

³ The material of this section was the concluding portion of an unfinished manuscript in which it was preceded by Essays II, III, and IV.

but we could only be apprised of its passage by its decay in the midst of a space that did not decay. Space offers the channel and banks within which the stream of time doth flow. The separation of time and space belongs to the perceptual situation or perspective. Place ourselves outside it, and the permanent field of the spatial world itself is flowing, and only from another *locus standi* can its temporal passage be assessed.

An absolute space and an absolute time imply, then, a perceptual situation that is not a situation, a perspective that is not a perspective. Still the familiar experiences within the railroad train make it evident that we do automatically place ourselves in different situations or perspectives and reach a *locus standi* that is absolute with reference to a number of perspectives. The most general one of these is the axis of reference of the fixed stars from which all the motions within the known universe may be conceivably plotted. The mechanism of this process I have already indicated in the automatic taking of the attitude of the other in becoming an object to one's self.

But, if the perceptual situation does more or less automatically separate space and time, in so far as it implies a passage without change as a spatial field within which and over against which change takes place, it implies also a spatial change which is passing. Whether it is change of position or of quality, without passage it would not be change. Where one is actually moving, spaces pass, or, stated more accurately, the events which include the whole perceptual field are spatiotemporal. In a moving train, if one can avoid taking the attitude of the fixed landscape, one would be referring to the same succession of spatiotemporal events, whether one spoke of them as passing more or less quickly or of more or fewer of them as passing; that is, one would not separate the spatial and temporal aspects of the events. If, preserving the same attitude, one sought to secure a timeless space—I am assuming that one's entire perceptual field is moving—one would regard one's self as instantaneously at rest, and points in one's space would in the passing field be paths of those points or world-lines, lines would be

surfaces, and surfaces solids, while a solid would give rise to nothing further than would one of its surfaces, since our spatial world is only tridimensional. By arresting one's self at successive moments while the spaces hurried by one, one would identify in each the homologous positions with reference to one's self and so build up a space which would be independent of the passage. What is attempted here must be distinguished from what may be called the normal situation, that in which motion takes place within a nonmoving field, that is, a field in which there is passage without change, in this case change of position. In so far as there is passage without change, time is separated from space. I am asking for such an identification of passage and change as we approach in a rapid motion, in which things fly by us without being placed in a nonmoving field. In such an experience rest would be represented only by homologous positions in successive spaces. The organization of these into a whole would result in a space through which all these successive spaces would be passing. Over against the passing spaces this space would not pass and would be in so far timeless, that is, the recovery of an identical set of spatial relationships in each passing set of events would constitute the permanent structure which does not pass, although there is ceaseless change. If, on the other hand, we solidify these into a changeless landscape through which the train is hurrying, we reach the nonmoving field which is the common background for motion in any particular situation or perceptual perspective. In this solidification of the passing scenes, the motion with its temporal character is removed from the scenes, whereas I have suggested the possibility of capturing a timeless space within the moving scenes themselves. If, instead of capturing a timeless space out of homologous spatial elements, we remark the *succession* of moving events alone, we reach a passage which constitutes a spaceless time. Such a time is also a system, an order of passage. This order of passage comes to us in varying spans, or specious presents, as we have seen, and the succession of different spaces will give us different series, for the reduction of the passage to

a series takes place by the imaginative compression of a specious present into an instant in which the passage is contracted as much as possible. If we contract two presents of varying span—varying, that is, with regard to events that are there as simultaneous—we will evidently get two different elements in our series and, therefore, two different time systems of the same passing events. We ordinarily state this difference of time systems in the seeming greater length of time when much has been crowded into a short space. The biblical paraphrase of it is, “One day is with the Lord as a thousand years and a thousand years as one day.” However we may force them into the same Procrustean bed of a common Gregorian calendar, the temporal series in the life of one man will differ widely from that of another. If over against a set of events represented, say, by the letters of the alphabet, one were to frame a number of temporal series, in which, for example, one moment would have a span that comprised *c*, *d*, and *e*, while another comprised *c*, *d*, *e*, and *f*, and another *c* and *d* only, and so on in like fashion throughout the whole alphabet, it is evident that the temporal series would differ in so far as, for example, in one case *e* would follow *d*, while in another it would be contemporaneous with *d* and would be followed by *g*, and *pari passu* that the relations of these events to other contemporaneous events implied in the series (what one may call the landscape of the alphabet) would be variously distorted in these discordant series. We have been accustomed to recognize the different spatial perspectives of men differently placed, if for no other reason than because we can photograph them, but we have not been accustomed to recognize their varying temporal perspectives except in such general metaphorical phrasings as those adduced above. It has required the cinematograph to give any sort of photographic representations of them, and these fall short of presenting exactly such differing spatial landscapes answering to different time systems as would correspond to the differing optical perspectives which a projective geometry and draughtsman’s pencil can fashion for each separate locus of the eye. In fact, it is

known that only when velocities approach a respectable fraction of the velocity of light or when the cumulative differences in vast stellar landscapes betray themselves in minute shifting of stars on the photographic plate or of lines in the spectrum do the corresponding distortions of the spatial landscapes become appreciable. It is only in the subatomic world or in the utmost reaches of the heavens that these temporal perspectives throw spatial shadows that affront the eye.

In the familiar experience which I am recalling of the traveler in the swiftly moving train, surrendering himself to the perceptual situation, both the landscape and the individual are moving, and both movements are there. There ensues a continual recurrence from the flying landscape to the flying train, a continual cutting of the planes of one set of spaces by those of another, and it is these intersections which locate the homologous elements in the moving spaces and out of which is built up the space within which all takes place. The mathematical theory of such a structure in the midst of motions of varying velocities and directions with their own times and spaces Professor Whitehead has worked out in terms of puncts, rects, and levels in his theory of relativity. It is evident that any particular structure of space is not ultimate. It again intersects with spaces of other motions, but these intersections furnish the elements for the determination of the changes in a world of different families of durations. What strikingly characterizes the experience in the moving train is the shock that accompanies the passage from one attitude to another, owing to the different spans of perception. Now the scene spreads out and takes in a wide field of passage that persists without change and now shrinks to a series of objects that chase one another across the eye, following not only the shift from one's own motion to that of the landscape but from a distant focus to one near at hand. As the telegraph pole leaps into motion from a momentarily permanent field the spaces that belong to each come into confused reticulation with each other. The points of these intersections, that

thus belong to both series of rapidly following spaces, are those from which we bring order into confusion.

What the theory of relativity seems to have undertaken is the generalization of this and kindred situations in which not only times but spaces pass, varying as their mutual relationships (i.e., their velocity) changes, and in which identical events with differing spatial and temporal characters can be isolated. Of fundamental importance in the doctrine is the determination of the simultaneity of events. Einstein proves that events which by any conceivable process of signaling are shown to be simultaneous in any one system, in another system which is moving with reference to the first are shown to be nonsimultaneous by the same process of signaling. Whitehead more fundamentally shows that the organization of any system must come back to a here and a now, that is, to a perceptual situation, and that what he terms cogredience depends upon a relation to the individual that is involved in that situation, so that there result different families of durations such as have been indicated above and differing simultaneities dependent upon differing temporal perspectives. Whitehead insists that these different perceptual situations, with their different families of durations, are not subjective apprehensions but exist in nature.

Over against the interpretation of the theory of relativity stands the classical doctrine which may be said to generalize the situation of the individual at rest observing a moving body in an immobile field. Here space and time are separated. Motion is a temporal process that takes place in a spatially frozen universe. Times are determined by changeless distances passed over by the moving body. If two bodies with different velocities pass over the same distance, the passage that is common to both, that is, time as passage, is rendered absolute by the absolute spatial measure. Both situations are there, and the generalization of each is legitimate, but the relativist, apart from theoretical and experimental proof of his position, is justified in considering his generalization as the more fundamental, for the observer and his fixed field are always found to be moving, and it is the bear-

ing of this more fundamental generalization of the relativist upon the object in the perceptual situation that I wish to consider.

From the standpoint of the classical doctrine the object at a distance is there and, as a spatially determined object, is what it is at the instant that it is there. Spatial identity is independent of any passage that is involved in the perceptual situation.

If we ask what it is that is there, we come back to a body occupying a portion of the timeless space, and a measuring rod carried to the object would disclose the same dimensions wherever the object might be located. The rough extent of these dimensions is revealed by its visual extent at a distance, and contact imagery fills it in. The statement in terms of the measuring rod implies contact experience, that is, a situation in which there is no visual perspective, and in which all the differences that belong to different perspectives disappear in the contact object which we would reach if we carried out the acts which the objects at a distance tend to call out. From the standpoint of the classical doctrine of a timeless space this object of contact experience is there where it is in visual space at the instant at which it exists in the perceptual situation.

However, the perceptual object at a distance is not an object that is there at the temporal level of the distance experience but is the promise of a contact object that will be there at the end of an act. It is a future contact object that we perceive. If the space of the distance experience is the space of the later contact experience, we may affirm that the contact object of the future was identical with a contact object that continued to occupy that timeless space. If spaces pass, we cannot without reservation make that affirmation. If it may be assumed that the distant contact object in the perceptual situation is in the same family of durations as the perceiving individual, then, if the individual went to this object and applied the measuring rod that belonged to that situation, the distant contact object would be identical with the contact object promised in the distant visual object; otherwise not. Being in the same family of

durations in this case implies that the execution of the act which the distant stimulus calls out or tends to call out would lie in spaces which would be parallel to that of the visual experience. This, further, would be the case if one could reach the object as soon as seen, and this is what is implied in the contact imagery that fills out the visual experience. If, however, during the period of the advent of the visual stimulus the body had moved, then there would be no assurance that the contact object implied in the visual experience would be in the same space with that of the measuring rod. The body which I see at a distance has a definite measurable content, that is, a contact content. The agreement of these, the laws of optics enable us to work out with great accuracy. So far as the identity of the spaces implied is concerned, agreement between extent implied in vision and the measured extent would be reached if we assumed that we get to the object and applied the measuring rod the moment that the light wave left the object. But if while the light has been traveling to us the object to be measured has moved, then it does not lie in the perceptual situation, or is not cogredient with the percipient event, to use Whitehead's phrase, and we cannot assume that they lie in the same space or in parallel spaces. The implication of perception is that objects at a distance have contact characters—that, if we were there where they are when we saw them, they would be resistant to pressure. This may be interpreted as implying that space is passing with the velocity of the distance stimulus, in this case, light. Stated otherwise the homogeneity of space at an instant is expressed in the agreement between what we see to occupy space and what we find to occupy that space when we measure it. If the space of our instant perception is homogeneous, then, if we reached the object seen as soon as we saw it, the two perceptions would agree. But, if spaces are passing continually, this homogeneity could be assumed only if space passed with the same velocity as light, that is, if we could assume ourselves, so far as spatial determinations are concerned, to be at the object as soon as we saw it. In a space that did not pass we could take what time we

pleased to verify our visual extents by our measuring rods, for it would retain unchanged its structure. We are only justified in projecting our immediate contact experience into visual experience in a space that passes if the space passes as rapidly as light. If, now, the body moved, for example, away from us as the light wave left it, the assumption of our perception that the visual object is in the same space as ourselves would not necessarily hold.

The positions presented here are, then, as follows: (1) the implication of perception is the agreement between the spatial dimensions indicated by distance experience and those revealed by contact experience, i.e., the measuring rod; (2) the presupposition of this implication is that the spatial structure is uniform in the field in which lie the object and the individual or percipient event, to use Whitehead's expression; (3) so far as immediate experience (that approaching the instant) is concerned, we are at liberty to assume this to be Euclidean and uniform; (4) but variations in the spread of the specious present would give a different succession of events, and hence different time systems with consequent different spatial orders, though these may all be Euclidean, i.e., the same events would be differently ordered spatially as well as temporally, if in one case they were contemporaneous and in another they were successive; (5) successive spaces are parallel if they answer to the same specious present, otherwise they involve intersection; (6) if space were timeless, the implication of perception would hold uniformly so far as the uniformity of space is concerned, and it would hold as well in parallel spaces; (7) if spaces pass, however, we could have assurance of this parallelism only if the rate of passage were the same as that of the distance stimulus, for only in that case would the spatial structure involved in the seen thing be that of the contact experience of the individual seeing it; (8) the passage of space does not refer to the movement of objects in space but to the passage of a certain order dependent upon the contemporaneity of a certain group of events and the temporal and therefore spatial order which this

involves, i e., if from the car window I see a telegraph pole suddenly leap away from other objects in the landscape, the pole and that which is immediately adjacent to it represent a certain spatial set which is followed by other objects in the passage of events, and such a field is different from that spread which preceded it in which the telegraph pole moved with the whole landscape; this order would intersect the order that preceded it; such a succession of spaces by the accompanying shock apprises us of the constant succession of parallel spaces that melt into one another, giving rise to the apparent timeless space; (9) if these spaces pass, there must be some sense in the rate of this passage, (10) as the spaces exist only in the relation of distant objects to the individual or percipient event, and all perceptual spaces have a uniform order, it would seem to follow that the rate of passage must be identical with that of the physical process by which the distant objects and the percipient event are related, otherwise the spatial order in the perceptual field would be disturbed, for, if the spaces hurried on more or less than that process, which serves to constitute a field of distant objects, the order would be confused; (11) the passage of spaces in a perceptual world must be that of light, for these spaces are the orders of the relations of spatial extension between the events which are in passage, and this order involves the transmission of light waves, of which each wave is an event following upon another, and the succession of which constitute the temporal passage; the rate of succession of waves must be the same as the rate of light, for it comes to the same thing, the rate at which a wave moves along, and the rate at which a wave at a certain point is succeeded by another wave—or, stated in another form, it would be a contradiction in terms that in a visual space the movement of light should itself be visible; or, again, it is only because in passing spaces the motion of light has the same rate as the passage of space that there is a fixed spatial order within which other motions of less velocity can take place; (12) other motions take place in a visual space, but they are motions of visual objects, for which as visual both the pas-

sage of light and the passage of space at an identical velocity are prerequisites—in fact, the motions of these objects in a visual space is an expression of the difference in the velocities of light and of the object; (13) for the purposes of analyzing the temporal extent of events we reduce our specious presents as close as we can to instants, although they always involve passage, so that it makes a difference what is included within this approach to an instant, as in one case an event will succeed another which in another would be simultaneous with it; (14) the identity in the velocities of light and of the passage of space insures the agreement between the visual or distance space and the contact space, or that of the measuring rod, for parallel spaces, but this is an identity of spatial order of the body as seen and the body as possibly felt or measured; (15) it does not necessarily hold for the body after the light wave left it if that body were moving, for the movement of a body is a determining factor in its location in the cogredient spread or specious present, the assumption being that in the approach to an instant all motion of objects with reference to one another in the field disappears; (16) the mere fact, then, that the body as measurable is assumed to have moved between the moment of the light wave's leaving the object and the wave's reaching the percipient event or individual by definition places it outside this specious present and places us in the position of regarding the field of that specious present as moving with reference to the object; in so far as the objects were regarded as both within and without this specious present the spaces would not be parallel—from one point of view there would be simultaneity and from the other succession; (17) this amounts to saying that the body as seen and as measurable in terms of the elements of physical science will have different temporal and spatial characters and, in consequence, different mass or energy characters, and that these differences will increase with the velocity of the motion of the object of vision; (18) if the velocity reached that of light, the body would be both visible and invisible, that is, such a velocity in a visual world is inconceivable; (19) for velocities less than

that of light the Lorentzian transformations presumably represent the differences in the characters of space, time, and mass which must be ascribed to the object if it is regarded as still lying within the field of the specious present, that is, the instantaneous visual field that is correlated with the contact or measurable spatial order of the percipient event, or individual; (20) this would seem to imply that the Lorentzian transformation gives the temporal, spatial, and mass characters which the object must have to remain in the field where the measurement is made; (21) relativity is itself but one phase of a nature in which there exist perceptual situations which are determined by the relation of individual organisms to their environments, and in which the spatiotemporal extension is subject to the same determination; (22) there is, however, a constant among these different families of durations, that is, the velocity of light which is constitutive of the distance phase of the perceptual situation; (23) whatever other implications are involved in such a constant, it is certain that it could be discovered only by individuals who could place themselves in different perceptual situations and thus reach a nature made up of different families of durations, or different perceptual situations, over against the attitude of correcting not only one's spatial but one's temporal perceptual perspectives; (24) it is only the individual who can imaginatively place himself in an airplane while retaining his position on the ground who can realize that a point for one is a line for the other, or one who can retain the whole uniformly moving landscape from the car window while he watches the telegraph pole leap out of the scene, who can realize that the order of succession is dependent upon the particular cogredient set, or specious present: (25) and, in indicating to himself these different spatiotemporal characters, he also indicates from a position outside of both what is identical in them and thus discovers over against this attitude a nature that is absolute, at least in abstraction from those differences he has been contemplating; (26) such an absolute nature would not lie in an absolute space and an absolute time but would consist of passing events which suc-

ceed one another in differing orders dependent upon the differing cogredient sets, or perceptual situations, within which the same events occur, while formulas can be obtained for the translation of the spatiotemporal characters of the event of one spatiotemporal system to those of another to which it also belongs, formulas which contain as a constant coefficient the velocity of light, that is, of that physical process which is constitutive of the order of events in a distance space in all spatiotemporal systems.

We can now return to the earlier statement of perception as affected by futurity. We perceive things at a distance. Their perceptual reality as physical things is the contact character they will have if the act involved in the perception is carried out. This is most fundamentally expressed by their magnitude as determined by a measuring rod. So far as the laws of optics and their implications reveal these contact characters immediately, the character of futurity in the perception approaches zero, and we assume all things seen to have the revealed contact characters at the approximate instant of perception. The fact, however, that the body seen has moved between the moment of forwarding the light wave and the arrival of that wave at the organism dislodges it from the cogredient set in which it lies as perceived and places it in another family of durations. However minute this motion may have been, it has invaded the apparent instantaneousness of the perception. As already indicated, this instantaneousness is only an approach to a limit. There is always in every specious present a passage, and that passage cannot be less than that involved in the velocity of light. By the laws of optics the visual distant object is there as an object answerable to the measuring rod if it resides in an absolute space or in the same family of durations of passing space; but if in the period within which the light wave reaches the eye it has moved on, then its measurable character or content on the assumption of instantaneity with the visual object implies a different visual object, that is, if it was really farther away than it looked, it ought to have looked smaller; and, if we insist on proceeding on

the assumption of instantaneity, we must transform proportionately our account of it in terms of the measuring rod. If there were an absolute timeless space, we could make our spatial estimates entirely in terms of this and could disregard instantaneity; and this has been the assumption of the classical doctrine, based upon the fact that all the distortions of spatial perspectives can, in accordance with the laws of optics, be harmonized with contact experience of the measuring rod, but this ignores the equally ineluctable fact that contact space only exists in its relation to distance space and that distance space in the perceptual world, the only field of experimental science, is hopelessly infected with futurity. The assumption of instantaneity is involved in the jumping-off spot of one act; but, as soon as we are able to see ourselves from the point of view of the moving object, the stationary field of instantaneity begins to flow, and its spatial structure is distorted. There being no position eternally pegged down that could not from another watchtower be seen to move, we come back to the recognition of what has been already affirmed—that the universe is made up of passing events which fall into different perceptual, or spatiotemporal, situations that determine their objects. What the theory of relativity has elicited is that this holds even of the spatiotemporal character of objects in the perceptual world. It has been able to achieve this by sending the scientific imagination behind the fact that the passage of light occupies an appreciable period, for distance space is optical. Thus even the most fundamental spatiotemporal characters of the world at an instant is contaminated with the not-yet. Our grasp of the innermost structure of things is experimental.

It is perhaps not out of place, at the conclusion of this summary statement of relativity in its bearing upon perception, to point out that the selection involved in any cogredient set at an instant is not of a more or less of a spatial spread, for, by implication, the whole universe is there at an instant, but it is an inclusion of certain successive events rather than others. The selection is temporal rather than spatial.

XXXI

MISCELLANEOUS FRAGMENTS

A. THE ORGANIZATION OF PERSPECTIVES

THE undertaking is to work back from the accepted organization of human perspectives in society to the organization of perspectives in the physical world out of which society arose. The difficulty is found in the fact that the physical sciences present a situation out of which the human animal and his society have arisen. They seem, therefore, to offer to knowledge a world which antedates the social perspective and to present the conditions for their appearance. It has indeed been the procedure of science to explain society in terms of things which are independent of social characters and to represent the social situation as one that has been fortuitous and utterly unessential to the existence of that out of which it has arisen. Relativity offers the suggestion that every situation has its own history, that the past which determines the present is from another standpoint determined by the present.

2. There are three recognized systems of organization of perspectives. The first is that of mechanical causality, which lies, however, within a system, such as is indicated by the principle of action and reaction, or the principle of least action. The second is that of life, or of living organisms, which also lies within a system, that of form and environment. The third is that of human intelligence, usually called that of consciousness.

In the first the organization of perspectives involves either contortions in space-time, which alter the invariance theory for measured properties and of the proper times of each historical route, or else the intersections of different time systems. The principle is the invariance of natural law, whatever the theory of measured properties may be, or whatever the simultaneities

between events may be. This, however, is rather a condition for an ordered nature in the absence of absolute space and time, i.e., after abandonment of the classical theory of dynamics. The positive contribution of relativity is the variance in the order of the passage of events, i.e., the possibility of alternative pasts and futures. Thus the Copernican doctrine provides a different historical route for every particle in the world from that which obtained under the Ptolemaic doctrine. In each system the same necessity obtains, the necessity of natural law, but the world within which the laws obtain may vary. The past determines the future, but there is a choice of pasts, i.e., from the standpoint of the special principle of relativity there is a choice between alternative orders of events, while from the standpoint of the general principle of relativity there is a creative advance.

3. A perspective can be recognized as such only when lying in a field within which it is no longer a perspective. The railway lines approach each other in a perspective only because they are parallel.

It is the nature of our experience that it consists of perspectives that are recognized as such. The whole apparatus of vision in so far as it relates to objects operates through perspectives. If this were not the case, that which affects us as visual would not be an object but would be simply a stimulus. The fact that responding to the stimulus led to a contact experience would not identify the stimulus with the contact experience as the lasting reality of that stimulus. The two would be successive experiences, the one leading to the other, as a signal apprises one of the approach of a train without the identification of the signal with the train.

Visual perspectives imply a field of congruence of an object with itself, no matter what its dimensions may be as visually given at varying distances. This field of congruence is the area of manipulation of the human individual where the seen and contact dimensions remain approximately identical.

The community of the different perspectives does not immediately enter into the separate perspectives. This entrance im-

plies, first, that the fulfilment of the process of one perspective is dependent upon community of action within the common field and, second, that the individual or organism involved in one activity tends to carry out the other activities belonging to the common action and so enters into their perspectives.

4. If we admit such a thing in nature as the price of stocks, we can admit the mathematician's abstractions. But the price of stocks answers to actual buyings and sellings, while the abstractions back of the transformations answer to such characters as the interval which is only a constant that appears in the calculation of a happening from different standpoints. It never appears in any experience. Still, nature has the characters which express these constants and a mathematical structure which answers to the processes of the mathematician's mind, and there is no reason for denying passage in one respect if we admit it in the other. My point is that, if we take perspectives or environments seriously and take passage seriously, the references in the doctrine of relativity are to the so-called mental processes by which these are carried out, recognizing that answering to these processes there are aspects of nature which succeed one another in the same fashion as they do in thought. I suppose a plain way of saying this without philosophic implications would be that the relativist had discovered not a Minkowski world but a new and more accurate method of measurement.

The problem which has just been presented is that of the organization of perspectives² in its most difficult form, for the perspectives in relativity are mutually exclusive, and the solution I have suggested is in terms of mind: that mind is able to organize them through a mathematical doctrine growing out of transformations found in the development of the theory of electromagnetism, that in mind we are able to pass from one perspective to another through transformations and in that manner are able to occupy different systems, and I have as-

² See G. H. Mead, "The Objective Reality of Perspectives," *Proceedings of the Sixth International Congress of Philosophy* (1926), pp. 75-85

sumed that there are in nature aspects which answer to minded organisms. What is essential to such a mind is that it should be characterized by sociality in both its dimensions, for not only must it be determined by the different elements that go to make it up in the system to which it belongs but it must in passage be able to occupy successive systems so that it realizes itself in each as a member of the other or others. It has, of course, always been recognized that thought presented the most complete organization to which we could aspire, but it has been generally assumed that it possessed or implied a final systematic organization which would then be only in one dimension; that is, passage was not regarded as of the nature of thought, though it might be of thinking as a psychological process. But, if the universe does exist in a passing present and has before it a future which is not determined, though various conditions of it are determined, then the world that we see about us extends before us in various futures, and answering to each there is a past which is in some respects different from any other, though there are general conditions which determine them all. In deliberation the emergent is the organized choice which we make and which gives the world the future and the past which characterize it. When in the face of alternative and mutually exclusive possibilities an emergent arises which determines which possibility will be realized, the adjustment of things to the conditions which make either future possible in the selection of the future is the passage in nature which answers to the passage in the transformation in the mind of the mathematician, and it is to this situation that the constants that shake out of the relativist's calculations refer and not to a Minkowski world lying beyond any possible experience.

What is essential to mind in the sense in which I have adduced it, as carrying mutually exclusive alternatives, is that it should occupy both dimensions of sociality at once; that in its passing from the old to the new it carries along the systematic order by which it is defined. The material for systematic ordering of future and past it finds in those perceptual char-

acters which come from distance experience with their future implications, the imagery which is of the same stuff, and in the organism's responses to its own attitudes toward the future characters. This material enables a mind to foresee within the scope of any act, but that the minded organism may deliberate, may adjust its world to alternative acts, a higher phase of sociality must be attained; for the organism in taking one attitude with its structure of future and past must respond to itself as taking another attitude with its appropriate structures, and it is this phase of sociality which is the implication of the self. The principle of sociality² is as dominant here as in the lower phases of its expression; the principle is that the nature of something in one system affects its nature in other systems that it occupies. It is this which issues at the human level in systematic thinking.

5. The social organization of perspectives arises through the individual's taking the role of the other within a social act whose varied phases are in some sense present in his organism. When, therefore, he has within the social act stimulated himself to act as the other, he has aroused the beginnings of the act of the other in its relationship to his own act and the whole process. These tendencies control the expression of his response and become the generalized other, conversation with whom constitutes thought. This taking of the role of the other is possible because the social process is through the mediation of physical things. The subjective perspective is one which has become nonobjective, i.e., one in which a person finds conflict between the structure of experience as it arises in his common perspective and the common perspective that has forced him into cogredience. The subjectivity does not consist in the experience having the metaphysical nature of consciousness but in its failure to agree with a dominant common perspective which claims the individual. Thus the passage of the landscape is in the perspective of the passenger as taking place in the common

² For further study of the social character of nature see Mead, *The Philosophy of the Present* (Chicago: Open Court Publishing Co., 1932), chap. iii.

perspective of all the occupants of the train, of all who are in that consentient set, but the consentient set of those without the train triumphs over that of those within the train because it organizes more completely and successfully the processes which are constitutive of the selves involved in the whole act. The separate perspective of the man within the train, with its aspect of nature as a whole, hangs there as a defeated hypothesis, not in consciousness but in a nature which includes minds as essential parts. The distinction between the defeated hypothesis and the successful hypothesis of the landscape at rest within which the train moves does not lie in the greater objectivity of the latter perspective, so far as immediate experience is concerned, but in the experimental results of acting upon the two. Both consentient sets are there in nature, but one set only can maintain itself in the conduct of the community.

What are present in both sets are the relative positions of the points of the landscape and the train, i.e., the distant stimuli are there in independence of any interpretation, of any perspective; what the successful contact experiences in the use of the physical things will be, remains to be seen. It has been customary to assume that hypotheses exist only in minds and that we discover whether one hypothesis agrees with nature which is closed to mind, except in its awareness of nature. This doctrine assumes on the contrary that the hypotheses (both the successful and the unsuccessful ones) are in nature, in other words, that the processes in mind are processes in nature. This has been recognized in the trial and error of animal forms but not in the highly developed process of experiment as found in man, though this is but a refinement upon the trial and error of biological forms which are lower than man. What makes possible the importation into nature of so-called mental processes is the recognition of different simultaneities of the same events as existent in nature. They are existent as the relations between things from the standpoints of the different percipient events or organisms. The perceptual reality of the distant stimulus lies in the future. It is wrenched from that futurity in reflective con-

duct in so far as it is made simultaneous with the manipulatory area. The simultaneity of a mirage is there in nature as a possible relation. The physical thing water is that which answers to the completion of the act of drinking that is aroused by the visual stimulus of the shimmering sand. We establish the perspective of water there in the relation to our here. The filling of the distant stimulus with the resistant and thirst-satisfying water is primarily what we term imagery in the organism. If we find water, we affirm the reality of what is called imagery as that which was there all the time, simultaneous with the manipulatory area. If there is only sand, we assert that it was imagery and may regularize the implication by admitting that in the other case it was, as water, only in consciousness. A consistent theory of perspectives, however, will recognize that the content of water was in that perspective as genuinely as the color is in the perspective of animals endowed with chromatic vision. The difference lies in the perspectives. All our perspectives are measurably hypothetical, that is, while the distant buildings and mountains are there for us as resistant objects, they conceivably may be such stuff as dreams are made of and vanish when put to the experimental test. And the wildest imaginings relate events with contents which are in nature in their reference to the organisms, but there as hypothetical or, if you like, as possible perspectives.

6. The organization of perspectives takes place in rational experience. From the standpoint of a generalized other the individual relates his experiences as peculiar to himself. How is this generalized attitude attained? Whitehead states it in the aspect which everything has to everything else, the possibility of stating a thing in terms of its relationships to everything else, such as the stating of an electron in terms of its field. In social conduct the individual takes the attitude of another in a co-operative process. If there are a number of persons engaged in the process, he must in some sense take the attitude of all of them. He accomplishes this in getting the attitude which each assumes in relation to the common end which each has. He finds

an identical element in the attitude of each, which expresses itself in the different responses of the individuals. It is his ability to go from one of these attitudes to another in so far as each calls out the other that constitutes the structure of the system which imports the group into his experience.

What Whitehead omits is the presence of the other things in the experience of the individual organism. For him these relations constitute the individual but do not appear as other things in its experience; the world constitutes the thing but does not appear in the thing. In our experience the thing is there as much as we are here—our experience is in the thing as much as it is in us. Organization is being in a number of things at the same time. We attain this through participating in organized reactions of groups—the common content makes it possible to take the different attitudes and keep their relations. The organization is that of the act.

7. The epistemological problem is found in the objectivity of that which is subjective. The problem of relativity is found in the subjectivity of that which is objective. The solution of the epistemological problem is found in the recognition of the objectivity of the apparatus by which we reach the subjective, and the necessity of accepting the natural history of the individual and the community within which this apparatus was acquired. The solution of the relativist's problem is found in the recognition that the emergent value which the individual organism confers upon the common world belongs to that world in so far as it leads to its creative reconstruction. In so far as the world is passing into a future, there is an opportunity for that which is not objective to become objective.

B. HYPOTHESIS AND THE PAST³

The whole history of science has presented the succession of one hypothesis after another; each hypothesis was rational, and, when it was embodied in experience, was a necessary order, but

³ For a fuller exposition of Mead's theory of the status of history and the past see this volume, Essay VI, and *The Philosophy of the Present*, pp 1-31

a succeeding hypothesis showed that it was but an alternative. To be sure, the evidence that the later hypothesis carried with it was something which was new from the standpoint of the old world. It is the natural assumption of the new situation that this new element was always there and, therefore, that the rational order of this hypothesis was at work with its necessity. But there can be no question that the new was new in the experience of the world into which it came. Metaphysically we assume that these experiences were subjective in so far as they excluded the presence of the element which appeared as novel, that these elements were actually present, and therefore the necessity which obtains with the new hypothesis was operative under the old hypothesis, though it was not recognized. In the same manner we assume that there is present in the universe an indefinite number of elements which are novel from the point of view of our hypothetical explanation of it, and which determine beyond our recognition what is taking place. In this manner we put the characters which are future into the timeless universe and ascribe futurity with its essential novelties only to our experiences and make our experiences dependent upon this universe.

The possible alternative view is that each perspective is real in itself. It is physically real in the experiences that the individuals have who are there. These experiences are, then, hypothetically interpreted, and the judgment of reality is passed in so far as the hypotheses work. What conception can we form of the universe in so far as it is not present in that hypothesis? If we regard the universe as something that is simply there, and exhibiting itself in a series of events which are already necessarily involved in what is there, subjectivity, illusion, or some sort of imperfect reality is implied in the different views which have obtained as to this universe. What our judgments primarily demand is a universe that is of a certain sort, and in the nature of the case that universe which explains our situations has a past, and a necessary past which necessitates the present. That past, however, is hypothetical, and the proof of the hy-

pothesis must be found in some present. The pasts are continually changing with changing hypotheses. What we appeal to is some present. It does not disturb us that we look forward to a continually changing set of pasts which new hypotheses will bring with them. As long as we can have the present setting its stamp of approval upon our new hypothesis, we are willing to accept the past which the hypothesis implicates. There seems, however, to be behind this complaisance of ours the assumption that there is, of necessity, a wholly real universe within which arise these different hypotheses, and which tests them and thus brings us continually nearer to a goal, perhaps at infinity—which would be a hypothesis which would be entirely adequate and would therefore never change. The implication of this metaphysical assumption is that this universe is not in its reality subject to time. Nothing new could happen in it. Novelty would be simply the expression of our inadequacy, and that inadequacy would not be a part of the reality; it would be extra and imperfect impression. Absolute idealism hopes to deal with this by making the imperfections simply finite reflections of the whole, which lose their inadequacy when they are co-ordinated in the infinite. It denies the existence of the inadequacies and thus banishes the novelties from the universe and logically conceives the universe as timeless. If we bring the novelties into the universe, we must bring them in the form of experience in which they do appear, not in the terms of the past in which they were not present. The difficulty in doing this is that we at once construct a past in which they are present.

C. EMERGENCE AND THE PAST

In generalizing the perspective to include not only the environments of all biological forms but also aspects of the universe in so far as it is patient of all enduring structures and processes, one assumes that the organism in this generalized sense not only selects its field in the sense of possessing susceptibilities giving rise to the emergence of qualities but also selects the succession of events itself. Thus a plant selects chem-

ical and electromagnetic successions, thus giving rise to the emergence of growth and the life-process. The question arises whether these emergents are surface phenomena of the type of statistical results which present uniformities and continuities that are but an outward seeming of inward necessities. Or is it possible that the resultant emergents have results that are due to their emergent character?

The passing present, compounded of the past which is determined by the interpretation of the present and the future which comes to us as alternative possibilities, is what we have. The past is always necessary, but the past which is there is not necessary, i.e., is dependent upon the future which determines the present and its interpretation. It is the emergents that determine the selection of the futures and, hence, the pasts that are their so-called causes. The values are absolutes that arrive. The pasts that succeed one another could never be prophesied from one another. Nothing is lost, but that which arrives that is novel gives a continually new past. A past never was in the form in which it appears as a past. Its reality is in its interpretation of the present. No one would be surprised if he learned that the picture of the universe which our great-grandchildren will have will be as different from ours as ours is from that of the medieval period. We are fairly confident that what we have will pass in some form into the doctrines of the future, but the interpretation will vary with the emergent values which cannot be prophesied.

D. SOCIAL GROUP AND INDIVIDUAL MIND

The formation of opinion takes place through conversation of individuals with members of groups to which they belong or through that inner conversation of thought which is outer conversation imported into the mind.

The molding influence of the group over the individual is generally and variously recognized; what is referred to here is the dependence of the individual upon the different component parts of the group to which he belongs for the language symbols,

the expressions, by which he can recognize and refer to meanings and characters of objects. As examples of this dependence, one may cite the entrance of the scientific medical practitioner and health officer into the life of the man on the street and the absence of the scientific biologist, as evidenced by the growing willingness of the man on the street to consider and discuss infectious diseases and insanity in terms of modern science rather than in terms of traditional custom, while his nonacquaintance with the scientific biologist accounts for his inability to assimilate the evolutionary appearance of man with his ideas of an intelligent and moral order of the world. There is no greater resistance in the one case than in the other, but in the one case he has become familiar with the terms and the facts and uniformities which they indicate, while he lacks this mental apparatus in the other case. It should be noted that the press tends to use the mental apparatus of the average man to which it appeals for its circulation rather than to break into and enlarge that apparatus. Unless one is definitely seeking to enlarge one's knowledge, one generally reads what speaks one's own language.

If we are to understand the process by which the scientific methods and their results get into popular thought and practice, it is necessary to recognize not simply the conflict of interests of different groups but also the social conditions which determine the accessibility of men to new ideas and the terminology which indicates them.

Recognizing, then, that a man's reverie and thinking are an inner conversation that goes on in terms of his outer conversations with the groups of which he is a constituent part, it is suggested that study of this grouping from this standpoint is of importance.

Such a study would recognize, first of all, that that information does not break into and become a part of mental apparatus unless it is couched in the language of current social conduct. Thus the protection of one's family and one's self from a pre-

vailing epidemic makes the bacillus and its life-history a part of the world of the average man.

Such a study would investigate the types of social conduct in which are determined the apparatus of conversation and thinking, and especially the social ways in which this relatively fixed conduct with its apparatus of vocabulary and ideas is invaded by new forms of conduct with the consequent enlargement and change of this apparatus.

It is evident that such group conduct and the consciousness within which it takes place orients itself most readily over against hostile groups and individuals. Thus the labor group thinks in terms of its battle with the capitalists, the church group in its opposition to organized vice or scientific heresy. These attitudes close the minds on one side to the ideas and their symbols that mediate the conduct of the other. Patience of a new symbol and its meaning appears when some new phase of conduct has made it a part of daily life.

This presents, then, a pattern of ideas which answers to organized social conduct of groups, and in which the ideas and their symbols are defined by the function of interaction of members of the group, and to the incidence of new types of social conduct which force in new co-operative acts and the symbols and ideas that mediate them. Such patterns would be found, for example, in the conduct of labor groups. Their ideas of protection of their wage scale and the conditions of labor are organized about collective bargaining, which inevitably brings with it the ideal of the closed shop to render the procedure entirely effective, together with the control of the number of apprentices and the elimination of pacemakers, and the strike as the effective weapon in the warfare with the hostile capitalistic employer.

Government control of such industries as that of the railroads brings in an unwilling recognition of a public interest that must be taken account of in some conditions in determining wages and conditions of labor. Efficiency engineering brought out a hostile reaction to the effort to standarize methods of work to

produce the largest results, and so introduced another type of possible control. In the clothing industry a procedure of a board constituted by both the union and the employers to decide conflicts between them in accordance with mutually recognized principles brought with it the language and conception of a common body of ideas belonging to the operations of labor and the employer that has its place in the system by which the laborer protects his wage and his working day. It is in this fashion, that of new sorts of social conduct arising within an organized body of social conduct, that new ideas slowly make their appearance in men's minds. It would be of interest to look at men's minds as such patterns of conduct together with the symbols by which these composite social acts are carried out, symbols that answer to certain values and meanings in situations and in things; and to recognize the manner in which such patterns of social conduct are changed by the breaking-in of new forms of conduct with their symbols and ideas. For this purpose we would be called upon to present the various organized groups in the community, the patterns of whose conduct present the patterns of men's minds and, on the other hand, to indicate the new forms of social conduct that invade these and bring their new mental contents with them.

E. SCIENCE AND THE CONTROL OF CONDUCT

The problem is to learn and control the conditions of individual and social conduct.

Conduct, so far as it is stated in terms of the health of the individual and that of the community, has found and, in fact, has accepted a control. Of course, this is true also of the physical conduct of the individual and of the community, that is, the entire acceptance of the scientific conception of a mechanical physical environment has given a method by means of which the conduct of individuals and of social groups with reference to their physical surroundings can be governed. It is true that the individuals and the groups do not always so govern their conduct, but it remains true that they nevertheless recognize

and accept the method of the physical sciences as providing a method which should always be employed in control of what we may call purely physical conduct. While this is not so universally involved in intelligent biological conduct, that is, while unreasoned tradition and such cults as Christian Science still uphold a dogmatic instead of a scientific method of biological control of conduct, it is still true that it is always possible eventually to force upon the community and its individuals scientific medical control when its results can be experimentally justified.

What remains as yet without a method of scientific control is the conduct of the individuals and the groups as selves, i.e., those social structures out of which individuals arise and of which they come to be the constitutive elements. In politics, law, ecclesiastical, and, for the most part, in educational conduct, our methods are not those of experimental science but remain dogmatic, and the same is true of individual conduct as presented in the field of ethics. Experimental schools, juvenile courts, theoretically (and only theoretically) democratic political institutions, and ethical culture societies in the field of religion are sufficient indications that, if it were possible to apply scientific method with evident success within this field of social conduct, it would advance as irresistibly there as it has in physical and biological conduct.

The problem suggested above is to determine what are the obstacles in the way of the development and acceptance of an experimental method in social conduct so far as this is the conduct of selves, both as individuals and as groups.

A primary, if not the primary, difficulty is to determine the data, or facts, in terms of which the social problem may be stated. Logically a statement of the difficulty may be presented in terms of the distinction between means and end. The physical statement is in terms of means, i.e., in terms of necessary conditions—necessary in the sense that they must be anticipated as giving the fixed order to which any course of conduct must conform. The biological statement takes on as completely

as it can this character, i.e., biology moves toward physics and chemistry as its ideal of method. In so far as this is true, biology cannot state the end in conduct. As surely as entelechies have disappeared from the natures of physical objects, with the result of opening the door to a far greater control of the physical world, so will they disappear from the biological object with the result of giving a still greater control over living processes. It is only when we have been able to abstract from the function of organs or animals or plants that we have been able to control the function or the life. In so far as the function—the end—is of the nature of the object, it is a given end and cannot be an end to be secured. If digestion is the very nature of the physical and chemical processes in the alimentary canal, it is not something that can be set in operation, on the supposition that it is to be fostered or reinstated. For such ends it is necessary that we should seek a series of absolutely necessary physical and chemical processes going on, which by controlling we can bring about a result which is foreign to their nature, to which as physical and chemical processes they are indifferent. We can advance life only through a scientific account of living objects, in which account life and death have the same reality and in which the loss of life is no loss of content. Now facts which are themselves ends come into existence with mind, and in the history of society they constitute as essential a part of the field of inquiry as the physical and biological conditions under which men have developed. Logically the form which the end takes is that of the solution of the problem which appears in mind. This general form, however, is only a demand that conduct shall continue (the conduct which has stopped because of the inhibitions resulting from conflicting tendencies to act) and that the resulting form of the action shall give expression as far as possible to opposing tendencies. Such an end is, however, entirely formal and as such does not appear in conduct. The ends that appear are the hypothetical reconstructions of the field of objects, from which arise the definite undertakings of so-called self-conscious beings. The end constitutes no difficulty as long

as it is an end only and an unquestioned end. If an inventor is seeking an instrument in unquestioned demand, or a scientist is seeking the cause of some as yet inexplicable event, whose control is an object of desire, they wish to see only necessary events and objects which can be entirely depended upon in the construction of the hypothetical instrument or cause with which their minds are occupied. But when one is faced by a conflict of ends—with the ethical problem—or when the true social problem appears, in which the voluntary conduct of individuals is an essential part, then we are faced by conditions of conduct which are not necessary. This situation presents the fundamental obstacle to the application of the scientific method. It is but another way of stating this difficulty to say that the difficulty lies in finding or clearly defining the facts or data of the ethical or social problem, for while the facts in a problem are exceptions to a law or form of order which has in the past been accepted, and are not as yet recognized as subject to a law or form of order which we are occupied in discovering, still they are quite rigidly defined in terms of the order of things which have not been affected by the problem in question.

F. RELIGION, METAPHYSICS, AND VALUE

I. There is an incongruity between the meaning of the world as it has been stated in religious and philosophical thought and the meanings which appear as the result of the application of scientific intelligence to the solution of concrete social problems.

The former have been brought into experience by means of the universality of emotional and logical attitudes. These universal emotional attitudes found their expression in the universality of an ideal community which could only be made concrete in the sacrifice of the conflicting interests of individuals in existing societies and by the submission of the individual to the Deity in the realization of a fundamental attitude of sin. Both sides of this attitude called for the expression of the meaning of the world in terms of the renunciation of concrete values except as these could be found in the identification of one's self with

the interests of all others, and in the sacrifice of individual aims and purposes to the will of God. The meaning was therefore defined almost entirely in the emotional expansion which placed in the unknown end a value which indefinitely transcended all known values. It was a sublimation of sacrificed ends and purposes. On the intellectual side it appeared in a faith which transcended knowledge. On the logical side it appeared in the affirmation of the universal rationality of the world, in the conception of a supreme order which was imperfectly recognized in the visible and tangible world, but which brought all detail of existence into logical connection in the attainment of a supreme end. While this order could be found in the laws of nature, the order of the supreme mathematician, the mind was utterly unable to follow out the intricate relations of events and realize what the relations of means and ends must be in the divine mind. Again knowledge had to bow before faith, and any attempt to formulate the rational meaning of what transpires broke down except when such meaning was given by divine inspiration. Such a faith was the sublimation of a necessary ignorance which is only emphasized by the recognition of natural law and the ability of the finite mind to read some of the transcriptions of the supreme mind.

2. In the history of human society rational conduct of the individual has arisen out of the control which the individual attained over his impulses through the community attitude, the acquirement of which has made him a member of the community, and then in the reconstruction of the community order from the standpoint of the generalization of its ends and procedures.

The attitude of men as they became rational toward nature was first seeking its assistance or placating its hostility, as the habitat of the community. Nature was defined in terms of the habitat of the community. As the rationalizing individual rose above the present social order in his criticism or idealization of it, he rose above the view of nature as the habitat of his immediate community to that of a nature which was the home of a better community. Out of this sprang the conception of a given

society to be attained—the religious quest, the conception of a divine principle of the world which fashioned nature to support and favor this achievement, the conception of the widest possible society (a society of reason) which because it was rational included all minds and provided a universe of discourse, and the conception of an entirely rational world which was the habitat of such minds. The socially narrow structure of the Greek city, which could not be generalized to take in the race of men, was the seat of the discovery of the reason in its most universal form. Because of the hopelessness of the fixed Greek city-state as the form of an ideal community of all men as rational, the Greek conception of mind was impoverished. It could compass only the abstract reason and so later opened the door to mysticism. It was only the abstract reason that could be socialized, and this only in the impersonal.

3. To convert a morality into a metaphysics, into a science of fact and truth, is to attempt to avoid choice. The good things are not the stable while the evil are the illusory, but the function of conduct is to render the good as stable as possible and the evil as unstable as possible. "Reality" traditionally conceived is what existence would be if our preferences were justified—in which case search and struggle would be unnecessary. As the precarious remains, the dialectical problem of reconciling the two realms of existence and illusion is substituted for the metaphysical problem of knowing the traits of existence. There is a substitution of the dialectical problem of the simultaneous existence of the finite and the infinite for that of dealing with the contingent. The result is the regulation of life in accordance with a cult rather than the understanding of its actual conditions. Thus the ultimate of reason is the ability to behold nature as a complete mechanism which generates and sustains the beholding of the mechanism. The theory of absolute experience finds evidence of the perfect, the stable, the good, and the infinite in immediate experience—and then dissolves this immediate experience into illusion. Starting from absolute experience, it then arrays itself in the relative finite illusory experi-

ence—and yet makes its logic that of consistency. The contradictions indicate that the characters of the stable and the contingent are in conjunction and interpenetration. Such a union is the condition of all satisfactions. Without it there could be no good, for good is “better than.” Precariousness of nature is a precondition of all ideality as well of loss and trouble. Aesthetic objects come with unbought delight and thus have a peculiar pleasure; but, if there were no pleasures bought with intelligent effort, there would be no aesthetic pleasures. They are dependent upon this contrast.

4. The organization of social perspectives in human society takes place through the self, for it is only the organization of a group as the attitude of the individual organism toward itself which gives rise to the self, and it is the activity of the self, so constituted toward and in the group, that is responsible for the peculiar organization of a human community. This principle may be stated in this fashion: The consciousness of a situation is the embodiment of the structure or pattern of that situation in the reaction of the individual to it, and the indication of the structure or pattern to the individual in whose reaction it is embodied. While the relation to the situation is that of stimulus and response, it is simply there, i.e., the relation to the response does not enter into the content of the stimulus. The “what it is” is not essential to its mere there-ness.

That which creates the duties, rights, the customs, the laws, and the various institutions in human society, as distinguished from the physiological relationships of an ant nest or a beehive, is the capacity of the human individual to assume the organized attitude of the community toward himself as well as toward others. The attainment of this attitude on the part of the individual is responsible for the appearance of a situation in which new values arise, especially within which society deals with the individual as embodying the values in himself. This situation is expressed in the appearance of institutions, e.g., the church, government, art, and education.

5. There have been two attitudes of the American which have

largely determined his reaction to science—the philosophy of history given by Puritan theology and the will to understand the physical world about him that he might control it. Back in his mind lay some version of the plan of salvation as his interpretation of the world, and he believed that knowledge is power.

Both of these attitudes were sympathetic to the mechanical view of nature which grew out of the Newtonian natural philosophy. God was the superwatchmaker of Paley, whose mind and purpose were revealed in the operation of natural laws. Furthermore, it was only in the field of invariable natural laws that the inventor could successfully operate. Evolution, in so far as it suggested the origin of mind in nature and distorted the received account of creation, was at first unsympathetic.

The whole development of social institutions has, however, moved away from the theological interpretation and has found the meaning of life in the present rather than in the past and in the future. A metaphysics of the type of pragmatism was a natural American outgrowth. It is entirely in harmony with the will to power through the understanding of nature.

G. CATEGORIAL FRAGMENTS⁴

I METAPHYSICS

Does metaphysics necessarily present the universe as a whole, as a unit? Or is there a type of metaphysical thought that may be in some sense descriptive of the world so far as it comes within the range of our thought? Can we find out the essential characters of the world as they enter into our experience without attempting to present the universe as a whole? Such an approach would not necessarily carry with it the presentation of the universe as a whole. It might be a question whether we really can think of the universe as a whole. Without attempting that, however, we could try to discover the essential natures of the objects about us. The general tendency in later thought in re-

⁴ Taken, in the main, from student notes on courses on Aristotle, Bergson, Dewey, Hegel, Hume, Leibniz, "Philosophy of Eminent Scientists," and "The Problem of Consciousness."

gard to these values has been to take them out of the universe as such, considered as a whole, and to try to bring them into our actual conduct, our actual life, thus presenting a less transcendental view. That is, our philosophy has ceased to be other-worldly in its character; it is something that can be found in experience. Especially important is the necessity of bringing those values that have been given to other worlds into life itself. The values that have attached to the universe as it transcends the individual should be brought into the actual experience of it. The conception of these values involves thinking of the life of the individual as related to some process that goes beyond itself and trying to find there the values that should control conduct in experience itself. It would find the import of such functions as those of knowledge and skepticism in conduct itself.

2. REALITY

1. Appearance is the adjustment of the environment to the organism—that is, the effect which the environment has upon the organism because of the characteristics of the organism. Reality is the effect which the environment has upon the organism when the organism has responded to the primary influence of the environment upon the organism.

2. We must recognize that ancient thought took into account different degrees of reality. One thing could be more real than another. According to modern philosophy, there is a distinction between existence and subsistence. Existence is that which can be located in space and time, and subsistence refers to objects which are not so located and are yet objects of thought. But the scientific attitude, which is the dominant one, assumes a reality which is uniform. If we have an experience in which we see something that is not real, we are not referring to a something that has a lesser degree of reality than something else. We are referring to the solution of an inadequate inference; something seems to be something else, but it is not. Through the mists something looks like a tree, but it turns out to be a cow. As a tree, it is not real, but we do not assume that it has a lesser

degree of reality than the cow that we finally come in contact with. On the contrary we assume that its character as a tree is just as real as the cow, only that it is to be found partly in the vague configuration and mists which are just as real as anything else and partly in our states of consciousness—which, of course, are just as real as the actual cow. We have drawn false conclusions from them, but they have the same degree of reality.

Democritus assumed ultimate atoms, and it was the atoms themselves in their relationship to one another which from his standpoint constituted reality. From Aristotle's point of view reality is reached in the individual thing; and the individual thing is that which is not mere potentiality but is an actualization. Our science has kept those two attitudes more or less together. On the one hand, the world is made up of physical particles in relation to one another, and that constitutes for science the reality of the world. In the meantime the forms of different animals and plants are the things in which we are vitally interested. These the physical scientist has dealt with in terms of the abstractions that he has made from them. By getting the statement in this highly abstract form of the physical particles and their relations, he is able to get hold of certain definite conditions for the appearance of the individual forms. What the mechanical statement of matter does for us is to give the abstract physical conditions under which what for Aristotle was the real can exist. As a scientific statement it is not concerned with the philosophical implications of its content. Science has set up the ultimate atoms of Democritus as against Aristotle's teleological view of nature. Aristotle had to understand the world teleologically in order to understand its process. So he states it in non-mechanical terms and by means of that gets controls on the side of what has been called "consciousness." We have kept that view but also a Democritean world in which can be found dependable laws.

3. The pragmatic statement as over against the realistic statement conceives of knowledge as a phase in the process. It is simply a part of natural processes; hence there is no need to

explain how reality is real only in so far as it is reflected in the knowledge process. In order to get reality, we do not have to show that knowledge must reflect that reality. The central position of knowledge in reality is avoided from the pragmatic standpoint—the question whether a thing can be there as a possible object of knowledge. In order that a thing may be there, it does not have to be knowable. The realistic doctrine assumes that it does.

4. As Whitehead points out in referring to Hume's argument, Hume did not present the problem that is involved in dreams. You have a vivid dream, a nightmare; you are being tossed by a wolf. There is great vividness; yet there is no doubt that the experience is unreal. The different degrees of vividness have nothing to do with reality or unreality. It is neither the vividness, nor the multitude of detail, nor the corroboration of others that insures reality. The test is in the fitness of the phenomenon in the spatial and temporal structures in which one is living, in the significant structure of things. Hume does not recognize a certain unity of space and time, of the structure of things, which is the test of reality.

3 FORM

1. For an adequate interpretation of Hume, Kant's reaction to his statement of the problem seems to me essential, that is, Hume robs experience of all objects and leaves nothing but impressions and ideas. Now our experience has both, and there may be some assumed implications in these objects, as distinct from our impressions and ideas, which are unjustified, but actually there are objects in experience. There is a chair there, and we distinguish from it the color which we feel as a sensation. This is a datum, and the object is an object with its unity, and not only with this unity but with its duration. There is a something in experience which is there and which has to be accounted for, and which is not accounted for by breaking it up into ultimate elements. There is a whole taking place which has to be there in experience before we can get the separate experiences

that for Hume are simply associated together. Kant's criticism is that Hume made an inadequate analysis of experience itself.

2. When we have the parts into which we have broken up the whole, we cannot make a new whole out of the parts. There must have been some sort of a whole out of which the parts came. Analysis always implies a something that is already there to be analyzed. Our experience does start off with wholes of things that are there—chairs, tables, etc. Then these may be analyzed into definite parts.

3. From the point of view of a functional psychology, the different characters of a perceptual object call out a unitary response. If one sees salt, one responds in terms of the use of salt; if one gets the taste of salt, one responds to it in a similar fashion. Any one of a set of different stimuli will call out a unitary response, although the characters themselves simply stand out as separate characters without having any organization among themselves. That there is no unity among the stimuli is true of our perceptual world to a large degree. The unitary responses that belong to an object are called out by separate stimuli which in themselves have no relationship to one another. The sound of a voice or a step will serve to call out unitary responses to an individual. The field which belongs to the perceptual can be viewed simply from the standpoint of conduct in bare recognition. In that field there is no value to be obtained in the organization of the material which goes to make up a sensuous object into a whole. One does not organize one's material under those circumstances into the content of an object. The difference of the organizing attitude from bare recognition lies in the bringing-out of all characters that are essential to the treatment of the content or that are essential for identification. But in bare recognition of an object that organization is implied; one does not think about it.

4. Kant has, in general, stated that the form must be a form of the mind and must be antecedent. Yet we have in biology the possibility of accounting for the origin of a form. Goethe recognizes the appearance of different functions and different

forms of a function, which appear as an arm in the human being and as a fin in the fish. There is a digestive process which is a function of digestion, and there is a unity which belongs to the function, that is, which is responsible for the appearance of forms. The species themselves can have arisen in their specific characters because of the life-process. In the beginning of embryology we start off with certain functions that are there and are supposed to develop into the structure that then arises. The form arises out of the development of the function. This relationship of the function, the form, and the conception is by no means satisfactorily worked out.

4. UNITY

1. If what is seen in experience is always a thing in some stage of development, then its unity is always there. That is, a thing does not result from an additive process, and we must not attempt to explain what it is that holds together a group of separate elements. Or, if there is an indefinite number of elements in the universe, then we must account for the selection of a certain number of them in the isolation of a certain thing, and then the unity depends on the reaction of an organism. Whether we approach it in this way or in Aristotle's way it will always be the same thing but in different stages of development.

2. James's statement that unity is just something that is there seems to characterize our experience until we meet with problems. When a problem does arise, then the unity is gone so far as the content is concerned. That is the very nature of the opposition of the content; it is gone, and yet in a certain sense the form of that unity remains. You have perceived this something as a certain object. The unity of that object is dissipated. You have associated it with a certain experience, let us say that hazy, filmy thing which we call a tree, but now you have broken down that connection and yet you have an object. What is it? Not simply a separate element that may be there but something that was there and something that you are now trying to account for. You keep the form of it as something that

has to be reconstructed. You set up a hypothesis. It is true, as Kant states, that the unity of the hypothesis is the unity of your object in that experience. But that is not your attitude with reference to other objects. You do not always assume that your hypothetical structure, your organization of the object, is responsible for the unity of the object. When that is the case, you undertake to form an object, but the other objects about you seem to be unified just as they are. Kant has brought out a character of the object as such, which is logically antecedent to the actual content that goes into it in the sense that the hypothetical is antecedent to the object; but that is not the attitude which we assume toward everything else. The Kantian assumption, on the other hand, is that all our experience, in so far as it is a cognitive experience, is of the same character, that the appearance of objects in experience implies just such a construction as this.

5 UNIVERSALS AND PARTICULARS

1. The universal remains distinctly logical for Aristotle and is not a substance so far as it exists in the mind as a meaning. If Aristotle had been a behaviorist, he would have interpreted his logical form as an attitude which could realize itself, thus presenting the possibility of different realizations. He was not a behaviorist, and hence he could not get away from the universal as separable from the thing. Potentiality may seem to solve the problem, but he still has matter left over, and matter which is separable from the essence of the thing. He has that essence on his hands, and he can never satisfactorily deal with it. He does not put it in a world of ideas with Plato, and he is not willing to view it as a concept. Yet it is a problem, for he must talk about it and think about it.

If Aristotle had had modern biology, if he had been able to define digestion in terms of a living process, then he would have had the same interest in retreating from the specific form to a universal which might be considered a higher one than the mathematicians among the Platonists had in retreating from the

things that lay in the "betwixt and between" up to universality. But Aristotle, in so far as he is following out the lead of his biology, gets nothing in going from the forms to the process out of which the forms spring. The universals of a purely classificatory biology are really less than the particulars, while genuine universals are the sources of them. One does not get this specific lion out of the mere idea of animality, but one can take a life-process which must run its course in a certain environment and see how some life-processes will come to take on the form of a lion, and how some that of an ox, and how they exist in their relationship to one another. There is no control, no productiveness, in advancing from the specific form up to the genus. Hence the Aristotelian metaphysics and Aristotelian logic are really the logic and metaphysics of the individual thing. This is where Aristotle finds reality in its highest degree of development. If he had been able to isolate living processes, he might have discovered a reality which would have been greater from one point of view than the reality that is found in the particular thing. And he would have been forced to abandon the Greek distinction between universal and particular. Given a process that must carry itself on, must get to sunlight and to the stuff in carbonic gas, we can approach any particular form and ask how the process is there carried on. We cannot take a definition of animality and get any basis for the discussion of different animals. But with a life-process that can be stated chemically and physically we can see what particular situations give rise to particular living forms. Hence our account of particularity does not appeal to the irrational as does Aristotle's when it appeals to the irrationality of matter.

Biology becomes effective after it sets up the physiological process, which is the same in the ox and the tiger, and shows how they become these different forms by taking the living process as such in its definition and showing it as it appears now in this form and now in that. By giving this higher universal of the process, it gives man more control than it otherwise would. Just as in mathematics, given a locus of points, we can deal

with the conic section in ways which would not otherwise be open to us, so here we get a statement of life that we can trace through different forms and account for structure in terms of function.

2. From the Hegelian standpoint the particular is in opposition to the universal, and as such it is false; it is wrong; it is evil. But there is no place in the dialectic for that which answers to the exception. It is perfectly true that such data get their reality, their truth, from the point of view of a later interpretation, when they cease to be data and become mere instances. What, it seems to me, Hegel overlooks is the function of the data in the statement of the problem. The data from the scientist's standpoint present the conditions under which any problem can be solved. Of course, when the problem is solved, they have lost this value. Then we can say that the particular instances are gone, they are sunk in the universality of the law. Take the exception in the position of the planets and the sun in their reference to one another. Though we may have a statement of the actual position of those planets on a photographic plate, we may not yet know what they mean. Until we know what they mean, we simply have to measure them as so many spots. Our whole statement of the cognitive process lies in the particularizing of these elements. If other experiments establish them, of course, all of this particularity disappears. They are just instances of the law, without that value which they had before. So far as I can see, there is no place for this value in the Hegelian dialectic.

3. The weaving into the web of science of the experiences of the individual does not in any sense rule out what we would call the personal factor in knowledge itself. The ideal may in a certain sense remain the same. That fact was in one sense what may be regarded as Hegel's great discovery. In that sense his is a restatement of Descartes' position, though he attempts to work it out in a definite answer in terms of a logical process. It is the first time that the self had been definitely given a function in the experience of reaching the truth. The self up to this time has been regarded as more or less of a hindrance in the problem.

It represents that which is particular as over against that which is universal.

4. In the field of observation the individual finds problems of sensuous experience. He finds something counter to the situations of past experience, involving problems for which he cannot get solutions by tracing logical implications. He must state his problem in terms of a hypothesis which he has worked out, but the new hypothesis cannot be stated merely in terms of logical implications presented in accepted meanings. A hypothesis must be found which is different from the interpretation that could be given with previous information. The rationalistic method can never give a statement of the situation in which a new hypothesis arises.

5. We observe particulars only in cases of exceptions. We are always seeing in things contents which we do not define as particulars, since perception always has some sort of a pattern which must be taken as universal. Yet the universality which we perceive in the individual can not be mere similarity. Similarity has significance only as a basis for psychological interpretation.

6 PASSAGE

1. According to the position of Minkowski and the relativists, there is a passage which is actually going on. It is a passage which is actually in experience itself, a passage which cannot be divided into instants. We have the experience of continuous passage, not simply of passage from the simple experience of one instant to that of another instant. If one takes an anesthetic, one has an experience and then a later experience, but that which is left between does not answer to experience. We can conceive of an individual living in one instant after another and never having an experience of passage at all. In that case the significant instants will eliminate one another. Only if there is passage can memory give the past instant as the past of a present. The bare succession of instants gives no ground for pastness and memory, nor does the mere fusing of one experience with another give passage.

2. The ultimate criticism which is to be made of Hume's background of the law of causality comes back to the fact that in experience itself there does appear a process—there is a given process as a whole. A movement that is taking place, when it becomes intelligible, determines the different parts of itself as a whole. Assuming the observation of Zeno's arrow at a certain point, and at another point, and at another, and building up the motion of the arrow out of these separate positions, there would not be any succession in the experience. There would be one situation, and that would disappear; and another situation, and that would disappear. What we do have is the impression of a process whose intelligibility involves the determination of the parts of the process by the whole. The process itself is in the causal future, as Whitehead expresses it. What is taking place is what we perceive. That intelligibility of the process as a whole, as accounted for by the different stages, is what we know as the law of causation. If we know a process that is going on, then that whole will give meaning to the different stages of the process. We come back to ideal moments, or approximations of a simplicity which enables us to determine the so-called laws of nature. What we start out with is the assumption that the whole process will make intelligible the different stages in it. We understand one thing by its relationship to another

3. The specious present is not only a passing experience in a permanent world; the specious present does actually answer to a something that is itself taking place. Motion may be a statement of it, but it cannot be absolute in its statement. It may be necessary for us to resolve that statement into terms of passage in a different system, but it remains a passage of something that is taking place. The object that is there in experience is an object that is essentially going on. Our science, as I said, has hidden this, because it has sought to get the world at a moment in order to get exact measurement. It has broken up the continuity of passage into separate instants and has taken away the continuity in nature. Science has done this, of course, in the interest of exact measurement. Natural philosophy has a state-

ment of the result in the notion that the world exists only at an instant—existence only at a knife edge. Such a statement becomes an impossibility. It cannot give the continuity of experience and the continuity of the object in which, after all, the scientist is interested. If we get that object as continuous in the world as well as in our experience, we can get the world as continuous. Then we do actually have experience of that which answers to the laws of cause and effect. The reality of immediate experience is an experience of that which is taking place and the dependence of that which is taking place on the temporal structure that belongs to it.

4. The distinction between the future and the past is that the past is what it is, while the future is in so far indeterminate that it is not yet. But there is always a relation between events, both of temporal and spatial extension and of content. This relation is of the nature of the process of what is going on. We assume that the future flows out of the past. There is not, so far as experience goes, determination, for that which has arisen takes on a character which is other than that which has occurred and as such a whole becomes a novel element in the process. The future as that which is happening determines what may take place and in so far as it lies within the temporal spread of the specious present is as determinative as the past. The possibilities of action are of the nature of determination. The future enters more clearly into determination as alternative possibilities appear. The possibilities appear as alternative reactions which inhibit one another in so far as they are different expressions of the process of the organism.

When these are there ready for expression, the opportunity for one rather than another decides the conduct, and the future becomes thus determinative of conduct. The spread of the indetermination may be increased by the holding of the alternative tendencies in their inhibition. Furthermore, the organization of these tendencies may give rise to other opportunities, that is, a new whole of action may arise which is qualitatively different from what has been.

5. Duration is a different affair from temporally ordered events. I have referred to it as a present slipping into another, and this implies a difference between one present and another, that is, it implies change—implies that the later happening is different from what preceded and that that difference is an occurrence. Difference is difference only against a background of identity. There must have been something that has changed and which can be identified as undergoing the change. If we assume a temporal process—and here I am bringing under it duration and the ordered series of events—it must be predicated both of the change and of the identity which change involves, and we reach the abstraction of a Newtonian absolute time, or the temporal dimension of extension in a Minkowski space-time, which is the condition of the change. If, however, we adopt a relational theory of time, any succession or ordered series of events awaits the appearance of the change, but the reference of the temporal process to the identical which is implied in change as well as to change does not justify us in assuming an abstract passage which is independent of change. If all change is conceived of as disappearing from the universe, all temporality would disappear as well, though the conception of this situation is likely to carry with it the process of conceiving it and the psychological process of thought. Now the continual slipping of one present into another, which is always taking place in experience, does not itself involve a temporal order, though it does involve change. Bergson has emphasized this, pointing out that the exclusion of one event from another which a temporal order of events involves is not present in mere duration, that experiences in duration interpenetrate one another. The question comes back to the objective reference of the order of events which is mentally constructed in a past.⁵

⁵ The foregoing paragraph is the concluding paragraph of the "Note to Chapter 1," *The Philosophy of the Present*, pp. 28-31. It should follow the last sentence on p. 31 of that work.

7. RELATIONS

1. From Leibniz' standpoint any impression adequately analyzed would give us the entire universe. If we follow the implications of a light wave, we would be forced to come back to the molecule and electron vibrating, and so gradually to the whole universe. But I see no reason to assume that blue is made up of a billion minute perceptions. It stands there just as a unique experience.

For perception in the sense which does not involve consciousness but which does involve a relation of the world to the object Whitehead uses the term "prehension." The object prehends the rest of the world. Prehension takes in the entire universe in so far as a mass-particle expressed in terms of energy is related to or prehends every other object in its world. It is essential that there should be some sort of togetherness in nature. All these objects represent the world as it exists for this particular object or organism. We speak of certain objects as poisons, others as constituting food. These are what they are in relation to the form. We do think of them as existing objectively out there without relation to an organism. Given this attitude, the organism enters into a relationship with the world, the relation of prehension where the world takes on certain characters because of its relationship to organism. This statement of Whitehead's is Leibnizian in the sense that the world exists in relationship to the monad. There is not an entire parallel, as I see it, between Whitehead's statement and the Leibnizian statement. The striking difference is found in their conceptions of internality and externality. What Leibniz inevitably comes back to is the inevitable outsideness which is represented by perception.

2. Realists say that all relations are external. For the idealist, all relations lie inside the object; the meaning of the object is to be found in its relations. If we ask what anything is, we come back to a number of relations. But if, on the contrary, objects as meanings are not relations, they become relational only when we analyze them.

8 TELEOLOGY

1. The whole question of the reappearance of final causes in nature is important at the present time. The biologist, when he grasps function and looks at tissues as taking part in function, remains Aristotelian, though the ideal of biological science is to make a completely mechanistic statement. If, for example, one function of the respiratory organs is getting rid of carbonic acid gas, the mechanical statement of respiration must be adequate for this function. The biologist always feels that his statement is less perfect when he leaves it in simple functional form.

2. The teleological appears with the determination of the environment by the organism. The objects that appear in the environment through this determination are the ends of the life-processes of the organism. Their effectiveness depends upon their completion of processes initiated in the organism. The mechanical as opposed to the teleological is the effectiveness of lower-level processes within the higher-level process.

Organisms which act mechanically upon one another may bring about a higher organism if the processes in the different organisms are in some measure identical, so that they have a common perspective. The perspectives which are not common are the field of mechanical operation. The common perspective tends to complete itself.⁶

3. We of the modern world could accept a catastrophe of our own institutions and assume that out of it might arise a better invention, a more intelligent control of things. The rationality of man and the universe makes it possible for us to accept defeat without despair.

9 EMERGENCE

1. Emergence and perspectives—these are two conceptions with which contemporary philosophy is orienting itself. The exclusion of teleological elements in favor of the mechanical view of nature is unsatisfactory from the point of view of a picture of the world. And teleology is coming in again through its

⁶ From a manuscript

analogies in our more recent philosophical doctrines. When things get together, there then arises something that was not there before, and that character is something that cannot be stated in terms of the elements which go to make up the combination. It remains to be seen in what sense we can now characterize that which has so emerged. In any compound, say water, if we take the elements hydrogen and oxygen separately, we cannot get the character that belongs to the compound in them. There is something that has happened, fluidity and the capacity for satisfying thirst. Those characters belong to water, not to its elements. Aristotle, in his theory of causes, carried that character which has happened back into the process which led up to its happening. Our statement in terms of emergence simply puts it as a resultant and does not give it any relationship to the process out of which it arose. When combinations arise, we are in a new world, but that new world has not any mechanical causal relationship to the world out of which it came. What for Aristotle is formal and final cause is coming back as an emergent.

2. In the mechanical statement which represents the lower level in such emergent evolution there is no physical object with the characters that belong to the object. There are nothing but particles. When we analyze the object as such into physical particles for the sake of control, we are doing it from the point of view of an object; but, when we have nothing but the physical particles, we have lost the character as an object. If we break up water into oxygen and hydrogen, it loses the character which belongs to it in a combination of the two. We cannot carry the water character over into the elements. If one wants to quench his thirst or put out fire, water is there to act under those particular conditions, but it is not water from the point of view of the atoms and their relationship to one another. It is of interest to see that in the doctrine of emergence as the result of the combination of elements with one another every complex as such, in so far as it is a resultant, at any time does bring with it something that was not there before.

3. There are qualities in nature which answer to other parts of nature just as there are qualities in nature which answer to man's organic nature. Dewey seemingly wants a statement which will cover both kinds of qualities, those independent of the human organism and those dependent on the human organism. What is the relation of these two kinds of qualities? When we bring the second kind in, we really have the emergence of a new kind or order. We cannot lead the one over into the other. Physical particles and blueness are not of the same order, but the second has emerged out of the first. We have an entirely new order or perspective, a new level. Emergence, relativity, and pragmatism are three conceptions which belong to this modern period.

In what sense shall we speak of the nature which existed before the advent of man? Dewey does not deal adequately with this problem. Should we speak of it as though it would have been, had man been there? Were there objects such as tables, chairs, etc., or do they come just in human perspectives? There must have been some sort of nature there before man came, and Dewey does not deal with this. Man certainly arises in nature, and his experience is that which belongs to nature itself; this does away with the old dualism of the Renaissance.

4. One might expect that it would be shown how these various perspectives arise out of physical processes, but that is not the case. We make the statement of this world ideally complete, theoretically, and get nothing but mass-particles, electrical particles. We find these in different time systems, but the statement remains in those terms, and the organism as the living organism does not appear in such statements. That is, one can take any living process and resolve it into those factors. Then it is no longer a living process. No distinction between life and death remains so far as the physical-chemical statement is concerned. We can resolve any living process over into these particles, but we cannot show these living forms arising out of the physical process because we cannot separate them. We could not get their perspective if we left them simply in terms of the

electrons and protons. There are particles with their fields of force which extend throughout the entire universe in their relationship to one another, and when we advance to the next level of emergence, if you like, there are such values as pleasure and pain, and the *sensa*, but they are not part of that physical process. We must distinguish that statement from the statement one can make when one starts with observations and ends up with law. Then the data flow from the law. But we cannot say that color flows from vibrations in the central nervous system. Similarly life does not flow from the physical process. If we select certain groups in the lower level, we find no life, color pleasure and pain. The contingency between levels is of a different character from that within one level, and the causation is a causation of a different character. It is just an expectation.

10 PERSPECTIVES

1. Realists would locate color outside consciousness. But, in fact, color has relationship to an eye that is not perfect; put out the light, color vanishes—much as it does for the color-blind. There is thus a situation of multiple relationship rather than the simple relation of color and vibration. There is no transfer of color to the eye, but there is something in the retina and in the central nervous system to which the object is indebted for color. Briefly, color is related to the normal organism. The realists restored more than they suspected when they gave back the penny, for with it came color, shape, size; despite this they no longer had an object left because they were destitute of an assumption that other philosophers have used with good results, namely, that objects have characters in relationship to a perceiving event.

2. Relationships of the individual to his world may be causal or logical. Vibrations, pressures, stream into an individual as causal relations. There are other relations as well, primarily logical. Our relationship to the wall extends, under certain conditions and in certain terms, to the atmosphere and the electrons, so that, to cut off or select the wall as a separate entity,

we must employ the logical relationship. Tables and chairs could not exist independently of the organism, since it is placing and sitting that distinguishes them. Still no causal relationship is involved. In analogous fashion, there are certain colors in the mind with which one endows objects with no hint of causal relationship. Nature would not be colored had we no eyes; yet we do not paint on the colors with a brush. On the other hand, the organism does produce causal effects in nature. The human species in great measure determines its environment, determines what shall exist with it in causal relationship. From the standpoint of evolution such causal relationship is ignored, since, for it, the sensitivity of the organism determines its environment, its *locus standi*, whence emanate all motor responses. This is a logical relationship rather than causal determination and is properly termed "consciousness." A chair is a concept and a percept so long as you refer to its meaning, its character, as an enduring uniform pattern depending constantly on its relationship with the individual. Characters put into logical relationship in this manner belong to experience, yet not to the inner experience but to the field where experience takes place.

3. An organism, according to Whitehead, is any structure which we find in nature, whether it be an atom or a galaxy in the heavens. Bergson's position that it is only in the inner experience that we can reach the process as such is incorrect if the foregoing statement of Whitehead is legitimate. So far as the actual process goes, our space is permanent for us at least; and so far as it is permanent, it has lost that passage which is necessary for process. We stop the train in order to determine its velocity. We do set up this permanent space, and it is essential to the actual existence of motion. From the Einsteinian point of view, motion is subjective; it does not belong to the objective world. Back of the experience relative to ourselves lie the actual coincidences of events, and between these are intervals. The interval remains the same, but it is not the motion which appears in our experience. In Whitehead's objectivistic statement, motion exists in nature, and the world is definitely organized

with reference to the organism. The perspectives do exist in nature; nature as such is an organization of perspectives. We have to recognize that these perspectives exist in their relation to the organism. If you preserve a process as the ultimate reality which is essential to the nature of the physical particles, other aspects of the world are there from the viewpoint of other organisms, and all these aspects are essential to the reality of the world. We have to recognize not only the organism but also the world as having its reality in relation to the organism. If we take time seriously, Bergson says, if we assume there is such a thing as life or consciousness, anything to which a rhythm belongs, we have to see that this is the nature of reality. The organisms have correspondent aspects of the world which exist for them. Events succeed themselves in different time systems.

II. POTENTIALITY

I. Potentiality implies a certain process which goes on in a certain environment, and which will lead to a certain result. When we speak of a man having a potentiality for being a good thinker, or good mathematician, or good accountant, we assume that we could determine the principles of his mind in a fashion which would be applicable to it. And then we assume that, if we place such a person into a certain environment with certain stimuli, there will arise a mind of another character which we could account for as developing out of this earlier one by the same processes as those that we imply in the original mind. Our statement of potentiality tends to come back to such determinations. Of course, we may think of some entity which is a potentiality in itself. Biologists, for example, have thought of certain entities which they put into the form as that which is responsible for its development, without undertaking to state what the principles would be by which the development is carried out. But what we aim to represent in our explanation of potentiality is a statement of a process that we can understand to start with and then the way in which that process under certain conditions will become a different process.

2. Certainly, so far as physical matter is concerned, we would never be satisfied with the statement of a potentiality which cannot be conceivably translated into mechanical situations—situations that explain things that happen in terms of things that have happened. We would not willingly leave the explanation in terms of things that are going to happen. We want to make our explanations in terms of things that have happened, even explaining things that are going to happen in terms of things that have happened. In considering the artisan who has a definite idea, we can say that he proceeds by a final cause in the sense that he analyzes his end into terms of means and takes that series of means back to the point which he himself determines, and then he may go on in a mechanical fashion from one step to another. But even there we want to understand the processes, or least to explain how such an idea or end arose and how that idea is resolvable into a set of meanings. Where, for example, does a man get the idea of murdering somebody by the use of cyanide of potassium? We do not want to stop at the point where we say that here is a man with a murderous intent for the carrying-out of which he can determine the most convenient means. We want to show why it should work itself out in this set of means rather than in another.

3. The Aristotelian concept of potentiality as it starts with the substratum starts with forms from the point of view of their natures which are to be realized and are potentially present in the particle. We can say that, from the point of view of man, grass is potential cattle. That is true enough; but, in order that there may be the ox, man must treat the grass as science treats it, as made up out of atoms and molecules. He must look at the grass as an independent object, and only when he knows the rules controlling it is he able to make it potential cattle.

12 CAUSALITY

1. Assuming that causes are what are responsible for the world as we are able to understand it, there is no reason for not

bringing in all four of these causes to which Aristotle refers. We should arrange them. There is a certain stuff there, and there are certain motions, with immediate causes for these and other motions. There is the structure of the thing itself, and then there is the final cause. And, if what we are implying in the term "cause" is that which is responsible for a thing which is capable of being known, all those elements would enter into it. There is the nature of the solar system stated in terms of velocities of different bodies making up that system. We do not make a definite statement in the name of the sun alone but rather in terms of the various planets and their velocities about the sun. So that a statement in terms of velocities, acceleration, and deceleration has become the form in which mechanical science has stated the mass, the matter, and the cause of motion, the efficient cause, and also the formal cause, for it is in uniformities of these velocities and changes of velocities that we get what would answer to the formal cause from the point of view of that science. And, of course, we also have, so far as science is concerned, the appearance of biological science and the problem of the final cause coming in in a similar but also different manner.

2. It is the enduring character of the experience that contains in it the continuity of nature, that contains in it just that connection which Hume denied. There is something that continues. If there is something that continues, that which is there at the present time is responsible for what is going to be there in the future.

According to Hume, we have the impression of one moment and the impression of another. There is no connection between them but simply a uniformity that appears when we come to state it in the past. But, if we can get the actual passage into the world and find that passage with its essential relations as something that comes into experience, then the relationships in that passage are the very nature of the objects which we see; and the continuity of mass in its route is a continuity which is a law of nature. If we say that the mass is at a certain point and is

continuously there, what we are saying is that this mass is a quality which inheres at a certain route. Given that, and the relation of that past to that future is the law of that causality. It is this actual existence as a determining character in that very passage that gives assurance of it. But, extending that route in all directions, we get the law of causality, which posits a mass-particle in its causative future as well as in its causative past.

3. We can see that this continuum which Hume denies is actually given in experience itself, although the statement given for purposes of exact measurement seems to break that experience into moments which are isolated from one another. That is, the law of causation is given. We do get this continuum with the necessary determination from one moment to another. If we can now translate from this into another system, we can say that our law of causality is actually given in the experience itself. It seems to me that this is of very great value in presenting that which Hume persistently left out of his statement; that is, in experience there is actually given a continuous process with, if you like, its laws. What we perceive is determined by the object as it appears. We cannot perceive a triangle except in terms of relations of parts, but it is the relations of the triangle that make it the object that it is in our experience. We perceive the falling body as a continuous process. It may be that, when we have to chop that movement into a whole set of separate instants and then say all we have is a uniformity of positions, we have lost all continuity of motion. But relativity restored continuity to the scientific object.

4. The substance and causality of anything in a certain sense do come together in the statement made in regard to its mass. If we hold that reality is a process which takes place, in our scientific interpretation, along certain routes, and that these routes have certain abiding characters which it is the business of science to isolate (as distinct from the more contingent characters), in such a statement substance and attribute come together. If we speak of the reality of that mass as something that

exists at an instant, then we have a statement in terms of substance—then it is what it is at any instant; but, if that reality is a certain route of passage, then that character which it has at one moment is the cause of it at the next moment. We have the necessary determination of reality at one moment by what it was before.

5. What is true in a Minkowski world in which there is no permanent space is a repetition of a pattern in a certain time system, but no prehension of such a passing series into a whole which endures throughout a specious present or epoch. The endurance which does prehend the process into such a whole belongs to the phase of the act in which inhibitions give rise to perspectives in which the different completions of the act initiated in the organism select the patterns whose repetitions are irrelevant to passage and hold them in permanent spaces. In this manner the futures, or possibilities of conduct, actually enter into the structure of the field. And with the futures come the pasts which are the selections of the series which have led up to the inhibited situation and give the different directions of passage. The prehension lies in the controlling power of the act as a whole which limits and sets conditions for the completion of the process.

The causal series runs in a permanent space and in an abstracted time. The necessity is one that comes from behind. That which has taken place falls into an order in which alternative possibilities play no part. The necessity that is disclosed is a necessity which obtains in all the series of possible alternatives which spread out before the present in the future. And yet there remain these alternatives. The necessity does not reach to the point of eliminating the alternatives. Even when we face a situation in which there appears to be no alternative, as in facing unavoidable death, the facing of it implies that death has as many alternative characters as our manner of facing it carries with it. The inevitableness of death does not carry with it the determination that it will be a death of resignation, or protest, or triumph. Whatever is, is necessary; and whatever is, goes on

into the future. Necessity, therefore, goes into the future, but the present is less than the future, and this addition which the passage gives is not determined by the present. If it were, there would be no means of distinguishing the future from the present.

6. Necessity is simply the relationship of an objective whole in passage to the parts into which we analyze it. Any whole that we can grasp of something that has taken place must, as such, have as a part of it something that has taken place. If the world is intelligible, then its passage is intelligible also. Necessity is a necessity of something that is there. What Hume did not recognize is that the something that is there is an entire passage. It is not simply a series of instantaneous impressions on the mind. It is actually something that is there as a whole. That is the causal future in it, a something going on. We have an entire process, and that process as a whole is one that represents the determination of different states to one another. It is because it is there as a fact that we have necessity. It is not a necessity that is dependent on chance, but it is a necessity of that which is taking place in the determination of the process itself. There is a something taking place that determines it.

7. The concept is taken out of the operation. We measure our simultaneity by means of certain electric lines which strike the eye at the same moment. Under certain circumstances we get entirely different simultaneities from the point of view of the observer. The concept is determined by the operation itself. We practically substitute the spring balance for the muscular experience which we have in pressing something. That is given as a something that is going on. We do that for purposes of measurement, and our operation does actually contemplate passage of this something from one instant to another. The body itself has a definite causal relationship from a past into a future. Causation is this pressing through such a period. If we get this pull which lasts through a certain period, our causation is a passage of that bit of experience of effort. Even if we get effort through a certain period, Hume denies that there exists a

continuum of passage of one event after another. But we find that that sort of passage has a definite structure; empirically we get a law of causation.

13 CONTINGENCY

1. Precariousness for science is just the condition of its problem. If we ask science to make a place for the precarious, we ask it to cut its own throat. Yet Dewey seems to imply that the precarious is on the same level as the stable, as it was for Aristotle. But modern science does not put the precarious on the level with the stable. Modern science says that the precarious cannot be known in the same way as the stable can. Everything that takes place takes place in some system; this is the presupposition of modern science. Dewey seems to have the precarious in one sense and not in another. On the one hand, he seems to agree with the viewpoint of science. Science thinks that if anything happens, there is some system behind it—though it seems to be unsystematic because we do not know its nature. From this standpoint there seems to be no place for the precarious in nature. But in the individual's experience there seem to be all sorts of precariousness. Now what is the relation of this precariousness to the presupposition of science that nothing is precarious? Science would probably say that it is only because of our ignorance that things seem precarious. But actually the precariousness is there for the individual. Just what the relation of this precariousness of the individual is to the stableness which is the presupposition of modern science and which Dewey does not seem to abandon—this relationship Dewey does not adequately discuss.

Nature looked at from the standpoint of the different individuals, from different perspectives, would involve the precarious. A form adjusting itself to its environment often goes to pieces—cannot adjust itself. From its point of view the world is precarious, though its life takes place in a world which might not be precarious but perfectly systematic. Now, shall we say that nature is made up of these different individual perspectives and

is, therefore, precarious, as Whitehead and Russell say, or shall we regard it as physical science does, as stable? Shall we look at it from the individual point of view and call it precarious, or from the scientific point of view and call it stable? And what is the relation of these two worlds? Mechanical science also has the presupposition that living processes are all physical-chemical processes at bottom, which move in accordance with fixed laws. Now, living processes are also individual experiences, but there they have been viewed as objects selected by our consciousness and are not just physical particles. Objects or forms thus seem to be entirely dependent on consciousness. This is the implication which mechanical science leads us to. But we are now trying to get away from this and make objects and forms exist in nature as such and to see their life-processes as processes which seek to maintain themselves. Relativity is doing this for us. Whitehead assumes that there are certain patterns in nature as such and that there is a relationship between nature and these patterns, which relationship Dewey also speaks of as that between environment and form. For Whitehead a form or a pattern is in a consentient set, and it sees all nature from a certain perspective or time system. Forms in other consentient sets see the same things only from different perspectives. Dewey seems to imply the same sort of thing.

2. There are certain contingent events so far as our experiences are concerned, notably the sensuous characters of things. Though they happen under certain determinable conditions, I do not see any evidence that we might not have an entirely different basis for colors, sounds, or tastes. We might have a set of colors when certain sounds arise. The picture which the scientist presents of the distribution of physical particles in the world as carrying with it the redistribution of them at a later moment, is the picture of a world stripped of these contingent elements. When we come to these contingent elements, what we do determine are the conditions for a situation within which they occur. Then the question arises, How far is Hume's judgment in regard to expectation correct? Is there, for example,

after Hume's analysis any ground for not expecting an entirely different set of sensuous qualities tomorrow? There is nothing in the scientist's own statement of the world which in any way determines what the sensuous character of the world should be. Suppose we were all color-blind. Then the world might have been white and black, and all the colors of the rainbow would have disappeared. In place of them we would have the different shades of gray. Now, there are persons who are color-blind, some of whom see only yellow and blue. But this implies certain situations which can always be assumed to lead to the conditions of the appearance of these characters. In a theory like the Hering theory of color we assume that there are certain photochemical substances in the eye. Nevertheless, it is entirely contingent, so far as nature is concerned, whether, given this photochemical substance as stated in terms of electrons and protons, these different colors do or do not appear. It is not contingent from the standpoint of the physiological processes, the accompanying disturbances in the central nervous system. But that, when these disturbances take place, a certain set of colors should appear in experience—that is absolutely contingent. The mere colors flashing in experience present no continuum at all.

3. The law of probability is relatively simple—an arithmetical affair which depends simply on the frequency of things happening. It goes back to a sort of sampling of the universe. You have a bag of beads which are variously colored, and you put your hand into the bag and pull out various colored beads. The more frequently you pull out a certain colored bead, the greater the probability that the sample you have is a representative of the various beads and colors. In the situation in which we apply probabilities, we are looking for an order. Our probabilities can generally be based on this attitude of ours of sampling. We assume there is a certain sort of order there, and we are hunting for it. A fundamental analysis, such as Hume's, will question this assumption. If we start off with his assumption that there is nothing in any experience which gives evidence in itself of

another experience following or preceding, then, of course, we cannot admit any evidence of such a structure of order as that which is implied in the theory of probability.

4. We should reduce the contingency of nature as much as we can. We should get hold of those elements which are permanent. In dealing with change, we want to get that which is uniform in the change. We want something that is irrelevant to the change that is going on. The law of gravity is irrelevant to the process to which it refers. It does not change with the process. Our intellectual processes select out and hold before us contents which could exist at an instant, if there were such a thing as an instant.

14. SOCIALITY

1. Man sets the universe out there as like himself, identical in matter and substance. In considering the observational field, we get characters of the object like ourselves. This shows the nature of the inside of the object. In a certain sense, one deals with an outside, but, when one gets hold of it, one has a completely congruous experience—one puts into it the attitude which helps to get at it in terms of one's self. This, in short, reveals the social nature of consciousness, and the fact that the reflective process itself employs a mechanism of social conduct.

In balancing an ax, for instance, one is establishing a co-operative relationship with it and to this extent putting one's self inside the object. Similarly the log which one cuts will co-operate at a certain point. The process is essentially social.

2. It is naturally true that the self exists over against other selves. The relation of the individual to the community is one which involves the distinction of the one from the other. The self is defined in terms of the others. So far as our scientific knowledge is concerned, this does not involve the merging of the world in the self. It is true that the mechanism of thought and the meaning of things are found in the process of communication and participation, but that does not carry for us the identification of the external social reality with the social experi-

ence. We distinguish sharply between the world and the society which arises out of certain living processes. Now it is true that in cognitive processes and in thought-processes we state this world in terms of a mechanism which is social not only in its origin but in its process. But we do not at the same time identify the reality of this other with what goes on in the social process. That Hegel should do this is implicit in his assumption that the thinking process is the whole of reality because the true proposition arises in thought itself.

3. From Hegel's standpoint the distinctions of subject and object themselves arise from the process. The self, when it knows something, does not know its own states; it knows objects. This is quite in line with the behavioristic psychology. The essential difference between the latter and the Hegelian statement is that for Hegel the process is a knowledge process.

If we take the starting-point of the appearance of the reflective attitude in society, we can locate an Hegelian moment in the social development: the self realizing itself over against the individuals of the community, so that it finds itself in opposition to the other as essentially a social being. That is, when a man finds himself in opposition to some social order, as in labor conflicts, then the attitude between labor and employer is one of hostility, which we call class war. It appears, of course, in the conflict with the employer over such control as is expressed in wages and labor conditions, but the laborer as such under those conditions has to realize himself in relation to the employer. This characteristic, as we know, appears in class war. Individuals do realize themselves definitely in their oppositions to one another. Those oppositions are the starting-point for the development of the new social order. That is characteristic of social development as such, not simply of such modern problems as labor troubles, but it has belonged to all the class conflicts of the medieval period, such as the conflicts of the feudal groups in which people were called upon to express their servitude to the overlord. They attained the new selfhood that finds itself in opposition to the feudal lord. It is characteristic of that

development that a new individual realizes himself, first of all, in opposition to the lord opposed and depends upon that for the maintenance of his own self-consciousness.

4. As far as there is organized social activity, there is a distinction between the different members of the group; that is, one does one thing and another does another in this organization process, and the organized self or the generalized self of the group is the one which expresses the attitude of the others who are involved in the process. The varied activities are organized in terms of the act. In so far as the individual can fit himself into the acts of all, those attitudes of the others are organized; there is a unity. Individuals have different functions as they play different parts. That structure Hegel does not present, but rather the situation in which the individual objects to the way in which the game is played; he wants other individuals to use different rules played in a different way. Back of this, however, is the development of this self which is not on the basis of oppositions of the other to the self but is on the basis of co-operation in the response.

5. In the case of vivid self-consciousness you are actually realizing yourself in the thing itself. Take for example, the fine eater who orders the dinner and has the courses arranged in a way which answers to the succession of flavors and the succession of satisfactions which follow upon one another. His arrangement is an expression of his own impulses. He has a higher attitude than the person who through hunger gets whatever he can and devours it. The expression of it, on a finer side, is that of the youth going out into the world and seeking himself. We all go through that process, and we realize that the self we want has to be realized through experience. There is an indefinite yearning for something beyond one's self in the period in which the individual is not simply seeking for bare satisfactions but is seeking for himself in experience.

15 CONSCIOUSNESS

1. There is no reason for assuming that experience as such involves in itself an awareness of the experience. Conscious ex-

perience, however, implies also a consciousness of the experience. It is the cognitive attitude of seizing certain elements which are held on to. But experience itself does not carry the implication of cognition with it.

Consciousness is involved where there is a problem, where one is deliberately adjusting one's self to the world, trying to get out of difficulty or pain. One is aware of experience and is trying to readjust the situation so that conduct can go ahead. There is, therefore, no consciousness in a world that is just there as there is, for example, in the matter of personal relations; here there is consciousness according as there is adjustment.

2. In the early definitions of the phenomena of nature there was not so much as a recognition of an equivalent of our concept of consciousness. With the emergence of Stoicism and the religions of salvation came increasing interest in the individual and, with it, a recognition of an element of "consciousness." With the later idealistic philosophies nature itself became primarily a matter of consciousness. The pendulum now swings back; we are putting an element of consciousness into nature, though in a way different from that of Aristotle; but we are not denying the nature that is absolutely there. In fine, philosophy and science are moving toward a common perspective through convergent methodology. We may expect a reflection of this in the fields of social science and of experimental psychology. At all events, nature described in terms of relationships is coming more and more to take the place of the conscious stuff which since the days of nominalism has been losing ground. More and more do we find our realities in terms of relationship and of organization of responses.

3. When one reaches a point in experience that cannot be stated in terms of established experience, there one has a psychological statement and deals exclusively with experimental data. The experience involves a psychological statement that should be distinguished from the general psychological statement. The psychological laboratory deals for the most part with universal characters; as in the case of the psychological account of the person perceiving the color wheel. When the astronomer re-

cords a star observed, he allows for a personal equation. Nonetheless, at some point, the psychological statement is merely a statement of the experience of the individual with such and such a central nervous system; it furnishes a competent statement but only to the end that the experience may be repeated. The experienced object need not be repeated, although it is something that happened to someone. One will find out what it is in the future; for the present one can only say it is something that happened to one. It belongs, therefore, to the Minkowski world of space and time. One sets out a statement of the conditions under which it happens in order to test it. In all experienced data there are such data which cannot be stated as things because, in so far as they are things, one would respond to them in the common manner. The bit of stimulating experience remains and is not a part of one's scientific world. For the time being, it remains a bit of personal experience.

4. Mind and consciousness are not coterminous. Dewey recognizes this in stating that mind is a structure of relationships within the world and that consciousness operates within this relationship. It is, therefore, the task of philosophy to restore to the world the stolen goods. Mind, in short, is persistence of past experience, but as the sense of meanings that appear in the social structure, or mental characters in relation to certain things. It is thus a statement of relationships. Color is there only in relation to the eye, but the eye is also there. Awareness, then, is the point at which one is aware of the problem in the experiment. It is something unusual, something one must define instantaneously in order to relate it to the going world and so give it meaning. It is different from the situation where one knows. There is no awareness in reverie, since for awareness there must be something taking place with dependence and perspective. In the Minkowski world there are brute perspectives without meaning in which the organism moves to or from the spatial object. In the reflective world on the contrary (the world of things at an instant) there is ultimate reality of the thing in the process through which it is approached. All other

bases set up a bifurcation of body and mind. Nature is thus an organization of perspectives.

5. The functional explanation provides for the distinction between thinking as readiness to act in a special situation and the immediate factual datum, the starting-point of the act. One seeks situations where one can find one's self—situations that can be used as facts. This, however, is not consciousness; it is only where one cannot get at facts that one has consciousness.

When we can put an identical set of events into two persons or when two sets of events can be put into one person, we have consciousness properly speaking. In a like sense, if we set up different opinions about an individual object, we remain inside separate perspectives. If, on the contrary, we unite different perspectives and opinions, we have a content involving consciousness. From a conceptual situation, we can come back to a perceptual experience each could have.

Consciousness is inner conversation and is in the field of symbols. The person is equally conscious when he talks to someone else, although it is not so clear an instance of consciousness.

6. The old world of fixed and absolute time and space science has broken down, and its substitute in the form of the consentient set approximates more and more to what was called a "state of consciousness."

7. If one recognizes the body, including the nervous system, as a part of the surrounding environment, with the value which objects have directly in experience—à la Bergson—then the contents which dualism has placed in consciousness will be found in things, and a large part of mind will be found—à la Dewey—in the structure of the environment. What remains in the bodily structure can be stated in terms of behaviorism—à la Watson.

16. REFLECTION

1. In dealing with reflection, we now seek to lift it out of the mentalistic terminology and place it in behavior. Physics and

biology recognize the logical relationship existing in nature between objects carved out and nature itself, and this relationship is not put into mind. To go back to what is involved in behavior, reflection is found in that imputation of characters which is made to other individuals through the direction of attention. Such direction of attention to the object in relation with the individual is, however, only a refinement of the relationship of the form to its environment. Food, for instance, becomes an object to the animal because of previous experience, so that it exists at the present period in relationship to the individual. Selection, therefore, lies in the relationship of the organism to the world. For the logical structure of the object, selection is not responsible. Selection is rather the essential factor in the logical relationship of the organism to the environment. This type of reflective conduct may become co-operative activity. By its own conduct or act one form may call the attention of other forms to a certain character which has been selected in the relationship of the individual and his world. It does so by raising to a new level things that have taken place. In a herd of deer, when one deer discovers danger and throws up its head, others, doing likewise, catch the same scent. Here the action of one form is causally operative in bringing the object into the environment of another. So that the reflective process is working upon a process already there; a whole group is stimulated. On the other hand, when a person in a theater shouts "Fire!" he has presented something as existing; he is logically operative. It is not merely a stimulus setting off a train of events, so to speak, as is the scent in the instance of the deer. With persons "fire" means something going on, crackling, hissing, etc., somewhere. It is, in short, a hypothetical object, and the reflective process is responsible for the hypothetical content given to that world in which the individual finds himself. Gestures thus indicate existences of hypothetical character. But when a person screams "Fire!" he is not only fastening attention on a hypothetical object—he is setting up an object with definite content and leading up to a specific end: if others approach, they will be

burned; if they flee, they will be saved. So that, while a gesture brings into experience certain present existences, reality lies in the future, and behavior has consequently reference to what lies ahead.

2. In a nonreflective world one sees things with no reality at the present time. In a Minkowski world conduct has nothing existing on a plane with itself; one operates with reference to things that happen to be away from one; things lie ahead spatially and temporally. On the contrary, in the reflective process one pushes things away from one's self. In short, where there are alternative conditions, it is necessary to appraise the existing situation. One gets a cogredient world with permanent things, but things hypothetically there beyond the reach of one's hand. It is this hypothetical content that forms the basis of the behavioristic statement. The time and space experience and the reflective experience thus involve fundamental differences. Objects are spatially and temporally distant, and the forms are adjusted to the distant object. Time and space experience thus involves readiness to act in a certain fashion when the form gets there; reality lies ahead. The animal may be in an attitude of seizing the prey, but the what of it belongs to the future and the consummation of the act. Against this is the reflective field of perception. Characteristic of it are the different terminal attitudes the forms may assume in relationship to the object. The reflective attitude stops action and holds the form in the situation in which it is. This, however, is not the same as when in a conflict situation an animal remains quiescent; the lower animals do not think, do not ask, "What is it?" Conflict such as there may be is overcome by a play of stimuli. Reflection furnishes a world that is simultaneous, although the distant object cannot be manipulated. In the perceptual world the object is there without the distant experience of content which reflection supplies in the terminal attitudes. Immediate experience which goes on unimpeded to its consummation has for its result this consummation, so that the experience is of the immediate perceptual object that is there. Thus objects existing for us at a

distance have a character as distant hypothetical objects. Contrasted with this is the situation of grasping for something in the water: the attitude is not hypothetical; it envisages something in space and time. The situation of doubt, however, where one debates, examines all points to determine whether the "what" that one hopes it to be is actually there—this situation one gets only from a distance and where hypotheses are forthcoming to determine suitable lines of action. In grasping for the branch in the water, there is not the slightest interest in the "what" of the thing but only in the attainability of the object, be it what it may. In so far, then, as the object is hypothetical, it is of different form from the thing one reaches for while sinking. In the former case the value of the reflective attitude is to determine the condition for carrying out the action, finding a world with hypothetical content as the present condition of future action.

17. CREATIVITY

1. The assumption of a functional relationship between what is in the mind and that which is outside underlies the philosophic reconstruction which starts off with the thesis that the world which is out there is the condition for our states of consciousness. By formulating new hypotheses, the scientific mind itself creates new worlds. The explication of the functional relationship between mind and nature was made possible by the scientific approach. It has introduced a new type of philosophy—that of a creative process which is responsible for the world. If the outer world is taken as a condition for the inner, mind becomes actually creative in experience itself.

2. Wherein lies the creative activity or the reconstructive activity of an individual in a democratic society? The individual cannot oppose himself to the whole social order and attempt to set up his own will. Wherein, then, lies that reconstructiveness? It lies, first of all, in the statement of the problem. Here is a certain situation. We all agree to that. What can be done about it? The step which can be taken under those cir-

cumstances is some project which can meet that particular problem. That, then, becomes a basis for social reaction. It has to be accepted by the community. The individual puts his program in universal form. The thing he presents is essentially a social affair which arises through his thinking, his idea. I think there is a complete parallel between the social situation and that of the scientist. The scientist has his own hypothesis, and the question is, Is it the one on which the community as a whole can act or work? The individual is trying to restate his community in such a way that what he does can be a natural function in the community.

18. FREEDOM

1. The organism enters entirely into the act as a whole, and this is freedom. The action is the action of the organism and not of the separate parts. We cannot gather ourselves together when we do not feel free, and this happens frequently. But in freedom the personality as a whole passes into the act. Compulsion disintegrates the individual into his different elements; hence there are degrees of freedom in proportion to the extent to which the individual becomes organized as a whole. It is not often that the whole of us goes into any act so that we face the situation as an entire personality. Moreover, this does not necessarily spell creation, spontaneity; it spells the identification of the individual with the act. Freedom, then, is the expression of the whole self which has become entire through the reconstruction which has taken place.

2. If one is reconstructing one's situation, one's action may be called rebellion. That is the attitude of the reactionary, who believes that reformers are bolsheviks. But freedom lies definitely in a reconstruction which is not in the nature of a rebellion but in the nature of presenting an order which is more adequate than the order which has been there.

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